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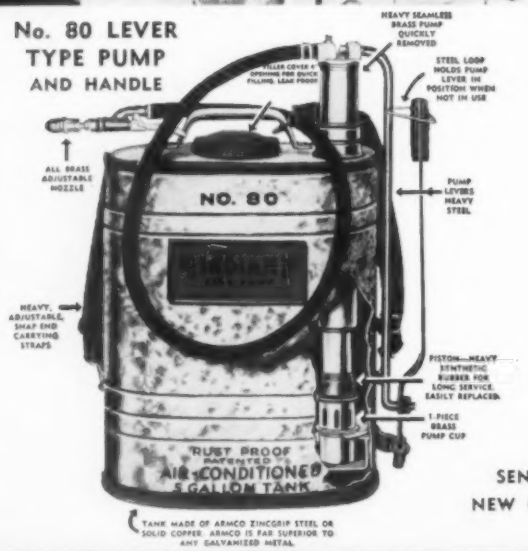
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Photo courtesy West Virginia Pulp and Paper Co.

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Forestry In The Soil Bank

W. S. Swingler
Assistant chief, Forest Service,
U. S. Department of Agriculture

IN AMERICA'S agricultural Soil Bank program, new fields of interest and study are opening up for foresters. Even the briefest review of the program indicates a splendid opportunity to keep forestry in America, especially the reforestation phase, moving at a fast rate.

The Soil Bank is a legislated mechanism designed to bring enough aid and assistance to farmers to encourage them to make their own concerted and direct attack on the problem of over-production in agriculture without fear of prohibitive income loss and farm bankruptcy.

Actually, the Soil Bank is two programs in one. There is the Acreage Reserve, which is designed to take out of production, temporarily and voluntarily, a part of the area that has been contributing to over-production of the six basic crops currently in price-depressing oversupply—wheat, cotton, rice, corn in the commercial growing area, and most types of peanuts and tobacco. Then there is the Conservation Reserve, intended to give producers something morally and economically acceptable to do with land which they would like to withdraw from the production of annual crops, over a term of years.

Putting it another way, the Acreage Reserve represents an immediate attack on the surpluses of crops and oversupply; the Conservation Reserve, a long-term withdrawal of any excessive or poor cropland including, possibly, a permanent withdrawal of some portion of unneeded cropland from future production. Among the conservation practices authorized for the Conservation Reserve is the establishment of vegetative cover on the withdrawn land—grasses, shrubs and legumes, or tree plantations.

It is expected that some of our best agricultural land will be included in both programs, especially in the Acreage Reserve. However, it is unlikely that this good land will long remain out of production. Reimbursement payments against temporary income loss while participating in the mutually-beneficial crop production cut-back justifies placing this kind of land in the Acreage Reserve on a year-to-year basis.

In the Conservation Reserve, there will be a system of annual land rents, technical advice and guidance, and cost-sharing for those practices which are undertaken to adapt land to conservation use. The costs involved would be discouraging, if not prohibitive, for many producers to undertake without the proposed help. It is also planned that short-term contracts, three to five years, will be made available to those landowners who may temporarily want to retire some of their land in the Conservation Reserve.

Much of the land in the Conservation Reserve is expected to range from medium to poor value; poor that is, for raising annual crops. This will include land subject to erosion. Most of this type of land, it is expected, will be withdrawn for long terms and some, it is hoped, will be permanently retired or diverted to other uses. This land, in most cases, would do well in trees. Happily, for the sake of forestry in America, tree planting is one of the long-term conservation practices approved for the Soil Bank—in fact, the longest term.

The outlook at this time, therefore, is that there will be considerable planting of former cropland to trees as a result of the Conservation Reserve program. Think what this would mean if most of the land not now needed for crops, or not suited for best crops production, were planted to trees. We face, in effect, a truly man-size job of tree planting that would result in a substantial advance in our total forest area. Remember, too, that there will be added plantings on some of the better class land, as in the shelterbelt country, where tree growth, for one reason or another is needed without too fine regard to the land value for other uses. The Soil Bank offers a favorable opportunity to start such growth.

Now for some of the mechanics and conditions of the Conservation Reserve. In this program the farmer will enter into a contract with the Secretary of Agriculture, designating the land to be withdrawn and stipulating the conservation practice to be undertaken as well as the term of years. While the Conservation Reserve will extend beyond 1960, the contracts must be entered by December of that year. They may run from three to ten years except that, in cases of tree planting, this term may be extended to 15 years where such additional time is needed to establish fully a thrifty plantation. Noxious weeds must be controlled. Grazing will be permitted only when specially authorized. Harvesting of products will not be permitted, except in forest plantings where products may be taken under good practices. There would be penalities for failure to comply with terms of the contract.

Benefits of the Soil Bank

Let us consider some of the implications in this new agricultural

program to forestry. Among the more obvious is the beneficial influence which an expanded forestation of cropland, unneeded for agriculture, could have upon farm living and land management. It is recognized that while a welcome extension of farm woodlands will not directly solve the problem of getting reforested the more than 50-million acres of forest land in need of planting it will bring to individual farms and communities manifold benefits in the form of better land, soil, water, and in some areas even better weather conditions and controls. It will increase habitat and suitable conditions for wildlife, including shade for fishing streams, and it will increase immensely the beauty of the land and the opportunities for healthful and inviting outdoor recreation. It will provide a home-grown wood supply and increase assurance of an adequate future industrial wood resource to meet our increasing need and demand for wood products.

Aside from the individual's interest in growing wood, there will be communities, areas, and whole regions in which this Soil Bank program will be an economic stimulus, where it will provide needed helps for forestry to play a more important part in the whole regional economy.

The Southeast, where the forest economy is already an important part of the total economy, is one example. Here, with cost-sharing help through the Conservation Reserve, farmers would be enabled to shift many acres hitherto devoted to a dubious farm economy into fast-growing, profitable pine plantations. This land, if brought back on a large scale to a paying forest economy, would provide greater profits to the landowners, woodland workers, and would attract or encourage greatly expanded industrial development—increased pulp mill capacity, for instance—that would be beneficial to the whole Southeast.

In New England expansion of white pine growth should be encouraged and could compete favorably with crops on many lands once forested but dedicated insecurely to agriculture—and erosion—for nearly a century. Given the stimulus of Conservation Reserve aids and the degree of blister rust control now attained, white pine crops could be safely and successfully encouraged. Here, as with pulp trees in the Southeast, the demand for products exists. And here, as in the Southeast, the restoration of useful tree growth to an even fuller participation in the area economy would be helpful and could be appreciably stimulated through Soil Bank help.

In the Great Plains, and the West generally, another situation, and opportunity, presents itself in the shelterbelt area. Shelterbelts to break the wind, to check soil blow and snowdrift, to protect cattle from cold and fields and crops from the hot, drying winds are a godsend in these areas. Many farmers have fought single-handed the hard battle of getting a few rows of shelterbelts established around fields, feeding lots, barns, and homes. The Soil Bank, with its cost-sharing financial aid and technical assistance to help in getting more shelterbelt plantations started and thriving, will mean the coming of a blessed and long wanted chance in these localities. Added to the protection benefits, as a mixture of the practical and the aesthetic, will be the coming of the woodlot for picnics, shade, and home-grown products.

These are some of the more-widely known area needs and opportunities. There are many more community and individual cases from the Atlantic seaboard to California and the Northwest. Here, too, the opportunity to get a favorable start through the Soil Bank in establishing an on-farm tree plantation and wood source will be a great satisfaction and an economic help to be looked upon as the coming of a blessed chance.

Administration of the Act

Responsibility for administration of the 1956 Agricultural Act, of which the Soil Bank is a part, rests in the Secretary of Agriculture. The Secretary has delegated appropriate parts of this responsibility to respective services in the Department. Responsibility for technical advice and guidance in forestry matters has been delegated to the Forest Service. At the field level, through established cooperative programs, this assistance will be available to the operating agriculture stabilization and conservation committees, and through them to program participants, from the state foresters or equivalent state officials.

The mechanics of Soil Bank field operations will be geared around the locally elected agricultural stabilization and conservation committees, who intimately know the farmers and the local farm needs and operations. Through the state A. S. C. committees, they will directly represent the Department's Commodity Stabilization Service and, in turn, the Secretary of Agriculture.

The A.S.C. committees will help the Soil Bank applicant to work up his participation program, and draw up his proposed agreement, which will include arrangements for annual payments. Conservation Reserve agreements will include, also, arrangements for cost sharing benefits up to 80 percent of the cost of establishing the chosen conservation practice. These local committees will sign the agreement with the applicant in the name of the Secretary of Agriculture. They will be responsible, also, for checking compliance.

In technical matters the A. S. C. committee will turn to and depend upon the established technical services for information, advice, and guidance. In forestry matters they will turn to the state forester or the comparable state forestry official. They will look to him also to assure adequate planting stock and to advise on selection of stock on planting sites and planting.

The Soil Bank does not supplant any other national farm programs, such as acreage allotments, price supports, or the Agricultural Conservation Program. Operations of

these programs are continued and will be made more effective. Neither do the authorized forestry practices supplant any of the existing cooperative forestry programs, such as cooperation with the states in providing public technical advice under the Cooperative Forest Management Act or of cooperative fire prevention and tree-planting assistance on private lands under the Clarke-McNary Law. These are continued and will probably become even more effective through the conduct of the Soil Bank program.

Problems to be Solved

Forestry has already faced one challenge in the problem; the providing of adequate planting stock. Every year since the war there has been an increase in seedling production, but this advance has been accompanied by a growing interest in tree planting and a consequent increased demand. So, we face the situation of more planting stock in nurseries, perhaps, than ever before, and there can be no practical assurance that it will meet promptly the immediate added demand of a program still less than six months old.

It takes time to produce seedlings, but the state foresters, nation-wide, are facing-up to this problem. They may buy under contract from private nurseries, and, if available, from existing federal nurseries. Many industries also make planting stock available to nearby landowners. Meanwhile, state nursery production is being stepped-up and nursery facilities are being expanded in those states where an increased probable demand is a practical expectation. The outlook is that there may be some nonvital delays in given areas, but that those who want to undertake tree planting agreements can do so on a wide scale and that they can anticipate an adequate supply of planting stock in time to fulfill their contracts.

However, availability of planting stock is not the only problem facing foresters. The question of whether there will be enough manpower to do the job is also difficult to answer. The call for trained personnel to handle the technical work in an expanding demand in all other fields is out-running the apparent immediate supply. And it could get worse. Industrial employment of foresters is at an all time high. State, federal, and semi-public research and other programs are already requiring intensive recruitment to meet all needs.

In this situation state forestry agencies and state extension services are going to be hard put to meet added demands for technical help and advice and for the educational effort and demonstration work which anticipated Soil Bank participation will require. There will be need for experienced personnel to work with the A. S. C. and other agencies on procurements, on adequacy of programs, and on performance standards. State agencies will be called upon to help in selecting planting stocks and planting sites, and in getting plantations well established. There will be need for men who can specialize in nursery techniques, production, and supply. There will be need for assuring that farmers are acquainted with the nature and opportunities of the Soil Bank program.

There is no way of telling how great this demand may be—how many acres of cropland will be withdrawn from production and placed in forests. There have been estimates that 20 to 25 million acres of land now used for agriculture should be "adjusted" out of crop production. There have been "guestimates," if we may use the expression, that perhaps 5 million or more of these acres are so poorly adapted to crops or so in need of permanent cover that their diversion to forest growth can be anticipated. But, at this point, nobody really knowns. The facts remain within the choice and decision of the landowner. Meanwhile, plans being laid in forestry are such that his needs can be met, if he decides to make it trees.

It would be difficult and premature to anticipate at this time what the full impact of the Soil Bank will be in forestry. Some of the leading farm organizations have expressed a strongly favorable attitude toward its conservation aspects and there is known to be a wide interest in tree planting among farmers in many localities.

This much seems obvious at this time: there will be a substantial participation in the tree planting phase. Moreover, this will bring to farmers an increased interest in forestry, and, to the modern farmer schooled for several generations in becoming informed on what he is doing, it should result in a far wider understanding of the opportunities in farm woodlots and of their management needs. These results alone could mean a great deal to forestry and to all of us who are interested in its professional practices.

Cost of Seed Collection from a Pine Seed Poduction Area

Bruce J. Zobel, Franklin C. Cech, and Ray E. Goddard
Silviculturist and assistant silviculturist, respectively, Texas Forest Service, College Station, Texas

THERE HAS been a great deal of recent interest in the collection of pine seed from special areas termed seed production areas[1]. Much has been written on the type of tree to be left for this purpose and how the stand should be managed. Several estimates have been made as to probable seed yields; however, practically no information is available on the cost of collecting seed produced on such areas. This is particularly true for permanent seed production areas in which the seed is harvested from standing trees by climbing.

This report summarizes information obtained for a permanent seed production area in East Texas. Two species are involved, namely loblolly pine (*P. taeda* L.) and shortleaf pine (*P. echinata* Mill), with loblolly predominating. Costs presented are above average and yields are conservative as they were obtained in the relatively poor seed year of 1955. Yields and costs will vary, obviously, from year to year, and from area to area, differing with age and character of the stand. It is felt that even the relatively low yield presented here will be of interest to those anticipating establishment of seed production areas and should give a much-needed general idea of how much such seed may cost.

Previous Work on Seed Production Areas

A voluminous literature has been built up on various phases of handling seed production areas. For this reason no comprehensive review will be attempted here. Almost every report on European forest tree improvement carries a discussion about selection of trees and stands with outstanding phenotypes. These are commonly designated as plus stands; such stands have been selected and used for seed production for many years.

In this country, some individuals such as Bates (*1*) have for many years actively advocated use of such areas. Cossitt (*2*) discussed the use of seed producing stands in the South. Easley (*3,4,5*) has reported on the yields and costs of the Westvaco loblolly pine seed production areas in the Coastal Plain of North Carolina. These areas, established in 1949, were thinned and the seed later harvested on the ground by felling selected trees. Costs and yields Easley obtained will make an interesting comparison with the Texas study where seed was obtained by climbing mature trees on drier, more severe sites than those in the Westvaco seed production areas. These comparisons will be made later in this article. In Florida, Mergen and Pomeroy (*8,9,11*) make suggestions for slash pine seed production area establishment. However, they give no data on costs or actual yields. There are a number of others, such as Reginster (*12*), Stoeckler (*13*), and Wenger (*15*), who give information on various phases of seed production areas. Mitchell (*10*) mentions the establishment of several seed production areas throughout the Southeast.

A number of seed production areas have been established in the South, either for research purposes or for commercial seed production purposes. The U. S. Forest Service has several, among which are some recently established by the Southern Institute of Forest Genetics of Gulfport, Mississippi. Several states, including Alabama, Florida, Georgia, Mississippi, and Texas, are working on seed production areas. The latter has established both the loblolly-shortleaf research area reported here and a commercial production area for slash pine. A number of private industrial organizations have such areas, most of which are for routine commercial rather than for research purposes.

Present Study

The seed production area under discussion consists of six acres of loblolly-shortleaf pine, located on a relatively dry site in Cherokee County, Texas. It is a mature, even-aged stand, averaging 44 years of age. The trees on the area are the best phenotypes available (Fig. 1). After removal of all crooked, large limbed, deformed, or otherwise undesirable specimens, there were approximately 20 trees left per acre. Although mixed stands are not generally recommended for commercial seed production areas, both good shortleaf and loblolly pine were left so that costs and yields could be obtained for both species. These two species normally do not cross due to a difference in time of flowering, but it is suspected that they sometimes do. On the area under study, several trees were found that had intermediate characters. This intermediacy was most obvious in the cone and seed characters.

The selected seed trees were released in May 1955, and seed was collected from the trees in October 1955. The total seed crop was moderate to light, as would be expected in a stand that has not been released for a sufficient period to have any stimulation of flowering due to release. For purposes of this study all trees were climbed that had over 20 cones visible through binoculars from the ground. All cones were collected by climbing, using the Swedish ladder. Trees were tall and clean for the

[1]A seed production area may be defined as "A stand or group of stands of specially desirable trees, set aside and usually specially treated to enhance seed production. Such areas are usually composed of natural stands or plantations not originally established for seed production and much less intensively selected and treated than seed orchards. Their genetic worth is usually not known; the trees are merely good phenotypes."

most part, averaging 62 feet to the first live limb. Most trees required the use of six or seven (of the approximately 10-foot-long) sections of the Swedish ladder, with two requiring the use of eight sections, and two needing only five sections. The trees on this area are about as tall and clear, and therefore difficult to climb, as will be found on most seed production areas (Fig. 2).

The climbing team consisted of one experienced climber, one new climber and one man to pick up cones, help move ladders and do other chores. There was considerable undergrowth and brushy material, even though the area was rather severely controlled burned just previous to thinning. The undergrowth slowed the job of picking up cones, with some cones being lost in it. Collection was made during a two-week period, several days of which were windy. This is of importance, because any great amount of wind decreases climbing efficiency considerably.

There was no attempt to attain ideal conditions, since it was hoped to simulate conditions that would be met in collecting from a similar area for commercial purposes. Considerable care was taken to minimize damage to small cones and branches that would bear cones in the future. Because of this, some cones were left on the trees.

In order to get accurate cost data, the following information was obtained for each tree climbed:

1. Exact time to finish a tree, i.e., to put up the ladder, take down the ladder, collect, pick up and bag cones.
2. Number of cones as determined by a binocular count.
3. Number of cones actually collected.
4. Number of diseased or insect attacked cones.
5. Number of cones left on the tree and not collected.
6. Seed obtained in ounces.
7. Number of seed per pound.
8. Percent of sound seed.

FIG. 1.—The tree with the ladder represents the good characteristics (phenotype) of the trees reserved in the seed production area. This is an unthinned check portion of the seed production area.

Results of the Study

Estimation of cone crop with binoculars.—To make a commercial collection feasible, it is essential to have a reliable estimate of the number of cones on a tree, in order to determine whether or not the tree should be climbed. One way to do this is to make a simple binocular count from the ground. Wenger (*15*) reported on the accuracy of binocular cone counts on loblolly pine. In the present study, a count was made on two opposite sides of a tree and these counts were then correlated with actual cones collected from the tree. Results obtained are shown in Figure 3.

On trees containing up to 50 cones the binocular count was quite accurate. To broadly summarize for all trees with more than 50 cones, there were roughly three to three and one-half times as many cones collected as registered on the binocular count. Of course, this approximate 1:3 ratio will vary with the size of tree, length of limbs, denseness of foliage, and the person doing the estimating. But it will serve as a rough guide until a similar ratio can be established for the seed production area in which one is interested. For example, Wenger (*15*), who did not describe the size of trees on which they counted cones, found considerable variation from observer to

FIG. 2.—A general view of the seed production area following release. About 20 trees per acre were left.

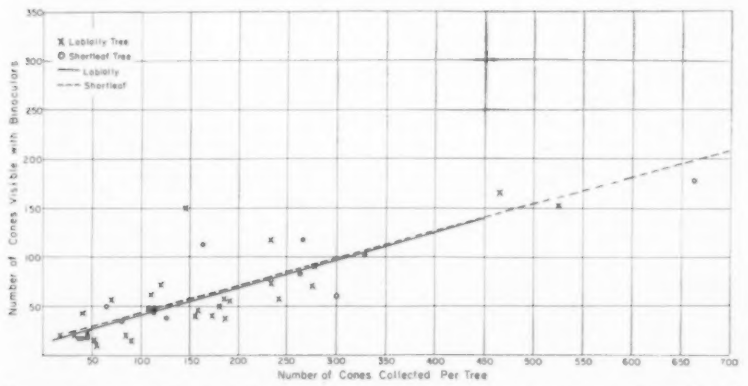

FIG. 3.—Relationship of number of cones visible with binoculars to actual number of cones collected. Binocular count was from two opposite sides of the tree.

observer. His results indicated a 2:3 ratio rather than the 1:3 ratio found on the present study. The larger the tree the more difficult it is to make accurate cone counts.

Time required to collect cones from standing trees. — Climbing times shown for cone collection reported here are about as rapid as can be expected for trees of this size, using the standard Swedish ladder. As previously mentioned, one member of the crew was an experienced climber and very efficient. The new climber, though slow at first, became rather efficient toward the end of collection and developed into an excellent climber. Climbing trees of this size is difficult physically for everyone and very difficult mentally for some. For this study, there was no more tendency to hurry climbing than would be present on a commercial operation. Climbing on this seed production area took place over a 10-day period, so the men developed a pace suitable for continuous climbing, and did not work especially fast as is often done the first day or two after climbing starts. Additionally, on this test, the experienced climber had just finished a two-week strenuous collection trip and was physically tired before the seed production area climbing began. The windy days slowed up the operation considerably, but some windy days in autumn are to be expected.

The time required to climb the trees is shown graphically in Figure 4. This graph shows one interesting point, viz., the number of cones on the tree add very little to the time required to collect from it. In several cases only five or ten minutes more were required to get a hundred more cones from one tree than from another similar tree. As a rule of thumb it would appear that every extra 100 cones on the tree requires about 10 minutes additional work to collect. Therefore, it is the nature of the tree itself and not the number of cones it bears that determines the bulk of the time required to collect from it. Anyone who has climbed also realizes that height is only one item in time, since some trees are difficult, others easy to climb, depending on branch form, shape, crown length, limb brittleness and many other factors. But from the data shown here, trees of the size in this study, (i.e., about 60 feet to the first limb) can be collected from in one to two and one-half hours, regardless of number of cones they contain.

Quantity and quality of seed obtained.—The practicality of climbing must be determined by the quantity and quality of seed obtained during a specific period of time and not merely by number of cones per tree. Figure 5 shows the relationship of yield of seed in ounces to number of sound cones collected, indicating the relationship of cone number to seed number that might be expected for such a moderate seed crop. Table 1 lists basic yields obtained in this study.

As will be noted, the loblolly seed were smaller (21,000 per pound) than shown by Wakeley (*11*), who reported an average of 18,400 seed per pound. The shortleaf seed were larger, here averaging 43,000 seed per pound, while Wakeley reports 48,000 seed per pound. This could well be expected, due either to variation within species, which is considerable, or to the presence of hybridization and backcrossing between the two species, which is strongly suspected. The percentage of sound seed is

TABLE 1.—BASIC YIELDS OF CONES AND SEED OBTAINED ON THE MAYDELLE SEED PRODUCTION AREA

	Loblolly	*Shortleaf*
Av. total no. cones per tree[1]	166	168
Av. no. cones left on tree	10	5
Av. no. cones collected per tree	156	163
Av. seed yield, oz. per 100 cones	4.4	1.3
Av. seed yield, oz. per tree	7.6	2.2
Av. seed yield, oz. per tree for trees with 100 or more cones (Av. 225 cones per tree for loblolly, 220 cones per tree for shortleaf)	10.5	3.0
Av. seed yield, oz. per tree for trees with 200 or more cones (Ave. 315 cones per tree for loblolly, 220 cones per tree for shortleaf)	15.6	5.0
No. seed per pound	21,000	43,000
Percent sound seed	76	67

[1]Arbitrarily, for this study, any tree with 20 or more cones visible from the ground was climbed. Commericially this figure would necessarily be much higher, the minimum probably being 200 cones for loblolly, more for shortleaf.

low, but can be explained two ways. First, it has been found that frequently in this region late frosts injure or kill either the female flowers or pollen. For example, the shortleaf pine pollen that produced the 1955 seed crop was frozen at a critical stage, and, although there was plentiful pollen, it had considerably less than 20 percent viability. Secondly, the hot summers common to this area often damage the yearling cones and "cook" the maturing cones on the western side of the tree. Incidence of insect damage was heavy, with from several to all cones on certain trees killed or damaged by insects. On a few trees, loss to squirrels was considerable.

Costs of collecting from standing trees.—It will immediately be obvious that reported costs can only be accurate for a particular set of conditions and will vary from area to area. In order to arrive at a usable cost figure, certain assumptions as to wages, resting time and the like must necessarily be made.

The major expense of collecting from standing trees will be wages for the climber. It is hard, dangerous work, and only certain persons are suited for and willing to do it. In the East Texas area the very minimum wage that a qualified man will accept is about $1.50 per hour, and in order to hold an experienced climber a wage of about $2.00 an hour must be paid while climbing. A suitable helper on the ground will need to be paid at least $1.00 an hour. Therefore, a two-man collection team[2] will cost from $2.50 to $3.00 an hour. All time expended during the working day will not be for climbing, and approximately one-third time must be allowed for moving ladders, resting, etc. For a loblolly tree containing a minimum of 200 cones and requiring approximately 1.5 hours for the collection, cost may be figured as follows:

Cost of two-man team per hour	$3.00
Cost to climb tree with 200 or more cones 1½ hours)	$4.50
Cost of ⅓ moving time, etc.	$1.50
Total tree cost (i.e., climb, pick up and sack cones)	$6.00
Yield of seed in cunces (trees with 200+ cones)	15.6
Collection cost of seed per lb.	$6.25
Number of seed per pound	21,000
Number of sound seed per pound (76 percent)	16,000
Collection cost of 1,000 sound seed	$0.39

It must be emphasized that the above calculation is merely an approximation of the cost of the seed

[2]Actually a good worker on the ground can take care of two climbers, but he must be an exceptionally fast worker to do so.

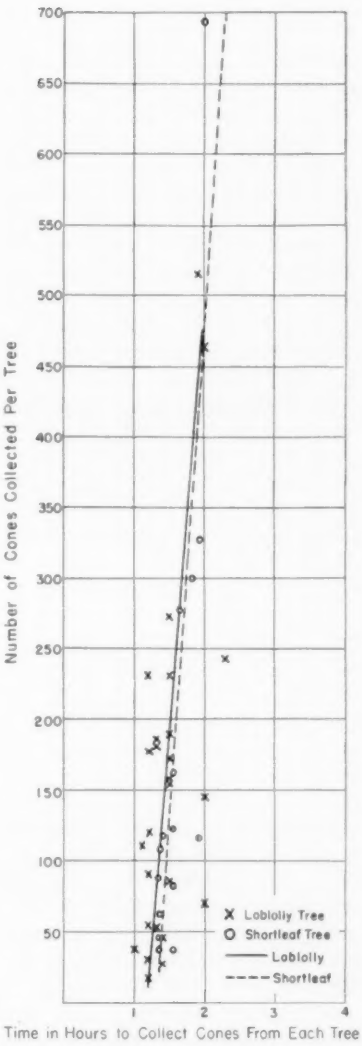

FIG. 4.—Relationship of time completing collection from a tree to number of cones collected on the tree. Note the short time required to collect an additional 100 cones once collector is in tree.

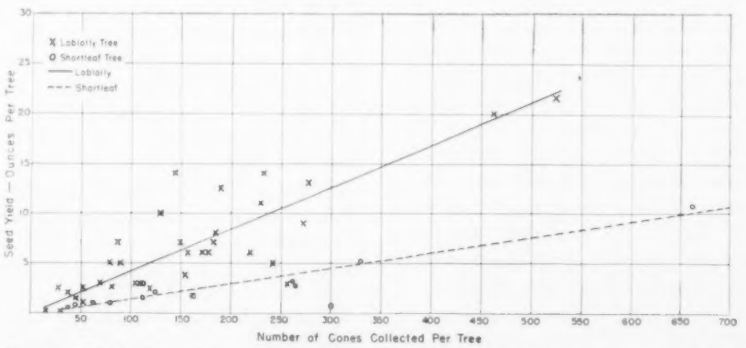

FIG. 5.—Yields of seed in ounces obtained from different numbers of cones collected from each tree.

before extraction, i.e., in the cones. The additional extraction cost will vary with each operation, but should be the same regardless of collection method used. Note especially that the cone yield is low (200 cones on a mature loblolly is a small yield), and the number of sound seed is low (76 percent). A larger crop, with better seed will yield seed at considerably less cost than shown here. Table 2 shows the costs of seed for various combinations of cone number. All costs are rounded off.

If comparable calculations are made using a climbing rate of $1.50 per hour, the cost of seed per pound will drop to $5.15 (200+ cones) and $7.05 (100+ cones) for loblolly and to $17.75 (200+ cones) for shortleaf.

Comparison with collection from felled trees.—As a comparison, a few figures from Easley (*5*) will be given for their yields and costs on a seed production area in North Carolina harvested in 1954, which is quite similar in tree sizes and characteristics to the Texas seed production area. However, the Westvaco area had been released several years prior to cone collection. In addition to reporting straight collection costs, Easley also indicated the costs of tree selection and the cost of seed extraction.

In 1954, the Westvaco area produced a much heavier crop of seed than the Texas area, having averaged 31 ounces of clean seed per tree to the Texas 15.6 ounces per tree (trees with 200+ cones). Their cone collection costs alone were $3.35 per tree or $1.75 per pound of clean seed. This is much less than the $6.25 per pound reported here, but if the Texas yield had been 31 ounces per tree the cost by climbing would then have been much less. It must be remembered the climbing referred to here is only on tall trees, none less than 50 feet to the first limb. Some are as much as 80 feet to the first limb. As smaller trees are climbed the time to collect cones is greatly reduced.

As it is so much cheaper to collect seed by felling the trees, it would appear that this method would be the best in handling a seed production area. This would be true if enough good stands were available so that needed areas of good trees could be released every year. However, few organizations have enough suitable stands to make such a procedure possible. Others must locate the best they have, then use those trees as long as they can be made to produce satisfactory seed crops, a procedure requiring seed harvest by climbing.

TABLE 2.—COST OF SEED COLLECTED BY CLIMBING, BASED ON A CLIMBER'S WAGE OF $2.00 PER HOUR

	Cost per tree[1] (Dollars)	Yield per tree (Ounces)	Cost per pound (Dollars)	Cost per 1,000 sound seed (Dollars)
	LOBLOLLY			
100 cone minimum per tree (av. 225)	5.60	10.5	8.50	0.53
200 cone minimum per tree (av. 315)	6.00	15.6	6.25	0.39
	SHORTLEAF			
200 cone minimum per tree (av. 410)	6.65	5.0	21.50	0.74

[1]Includes ½ time for moving.

Yields that can be expected from seed production areas.—Not enough work has yet been completed to answer the question of yields, but the few studies made to date can give some leads. The yields of the Westvaco and Texas seed production areas, both of mature loblolly pine, have been reported. The Westvaco area, responding to release (*4*) yielded 25 ounces of clean seed per tree in 1953, and 31 ounces in 1954. Easley (*4*) states that there should be about 30 trees per acre, although they actually have 21, 16, 9, 11 and 14 trees per acre in the several seed production areas established to date. The Texas area has about 20 trees per acre. Using the Westvaco figure of 21 trees and the Texas figure of 20 trees,[3] about 33 to 41 pounds per acre were produced in North Carolina, while in Texas 20 pounds of seed might have been produced per acre.

In Australia, working with young loblolly pine stands (16 years old) with different spacings, Florence and McWilliam (*6*) report that in a "poor" seed year (1953) they got 40 pounds of seed per acre and in a good seed year (1954) they harvested 70 pounds of seed per acre. McWilliam and others also have worked on species such as slash pine (*P. elliottii* Engelmann) and have reported yields and expected yields from such seed production areas.

Care must be taken in comparing yields of recently released stands with those where yields are based upon cone production three, four, or five years after release of the stand as reported by Easley (*4*). There has been considerable discussion, but little factual data, to indicate how long the effect of the release will be evident in the size of the cone crop produced. It has been commonly felt that the effect of stimulation will lessen considerably after about the fifth year. If this is so, then seed production areas, in which the seed is harvested by climbing, must be treated in additional ways to further stimulate seed production. Research is presently underway on fertilizer treatments, partial girdling treatments, pruning and others that have been shown to affect cone production and ease of collection. It is the authors' opinion, although not substantiated by data, that the released seed production area will continue to produce seed at an increased level over the non-released stand. The additional light, moisture and nutrients available following release should help to continue a higher production, although it probably will fall some-

[3]This assumes all trees have at least 200 cones per tree, a not unreasonable assumption after release has become effective.

what below the maximum effect evident the third, fourth, and fifth years after release.

Planting cost increase due to increased seed cost.—The additional seed cost due to harvesting by climbing will be reflected in additional cost of seedlings, and therefore in additional planting cost. By the use of some average data, the size of this increase will be indicated below.

Assume that the seed costs three times as much by climbing as by normal collection procedures. This is a liberal assumption since in Texas, for example, the collection cost of seed is about $2.50 per pound. The Texas Forest Service paid $2.50 per bushel for loblolly pine cones in 1955, and each bushel yielded approximately one pound of seed. The cost of seed by climbing reported here of $6.25 per pound leaves the ratio $\frac{6.25}{2.50}$ or exactly a 2.5 fold increase.

To the nurseryman a threefold increase in seed cost seems enormous. Yet, when reduced to a per thousand plantable seedling cost, the more expensive seed will raise the costs by about $0.80 per thousand plantable seedlings. Assuming the usual production costs are $3.50 per thousand plantable seedlings, the cost of seedling production will be raised to $4.30 by a threefold increase in seed cost.[4]

Of even greater interest, however, is the increased cost of planting due to extra seed cost. In Texas, where 6 foot by 8 foot planting is often used, 1,000 trees per acre is common. Although costs of planting vary widely, from about $10.00 to $20.00 per acre, an arbitrary figure of $15.00 per acre may be assumed. The increased cost to the planter is then $0.80 per acre, or percentagewise his cost increase will be about 5.5. Reduced to this relationship to overall planting costs, the threefold extra seed cost is not very large. This is certainly true if, by increasing costs of planting 5.5 percent, a stand of timber of a better genetic type will result that may greatly increase the value of the final product.

[4]This was calculated on the cost of seed to produce 1,000 plantable seedlings. In Texas this figure is approximately $0.40, a threefold increase making it about $1.20. The additional seed costs therefore is $0.80 per 1,000 trees.

Discussion and Summary

It is obvious that it is more costly to collect seed from better formed trees by climbing than by collecting from felled trees. The final determination of how much more expensive seed can be and still be economically feasible depends on the genetic gains expected. As yet, not many data are available on the latter, but work such as that done in Australia by McWilliam and Florence (7) has shown that use of only the best trees in the stand as a source of seed resulted in significantly better growth and better formed trees of subsequent stands. Actually, when one considers the very small portion of the planting cost that is due to seed costs, a doubling or tripling of seed cost will not increase the overall planting costs too greatly. Therefore, if significantly better timber yields can be expected at harvest time, use of seed that on first thought appears to be very expensive may be economically advantageous.

The study reported here deals with loblolly-shortleaf pine on the dry western edge of the Southern Pine Region. It indicated what the cost of seed obtained by climbing will be, from the best formed mature loblolly and shortleaf pine trees. From the results it would not appear feasible in our present state of knowledge to collect from mature loblolly trees that have less than 200 cones per tree, or if the seed is especially desirable, 100 cones per tree. For shortleaf, it appears many more than 200 cones per tree must be present before the seed cost becomes reasonable. The reader must be cautioned that the data and costs shown here are for one particular situation and as such only apply to the conditions described. However, they may serve as a guide to those interested in seed production areas and may be of value in causing some thought before large acreages of such areas are set aside. Tree improvement can be a valuable silvicultural tool, but as such it creates its own special category of expense, one of which will be increased seed cost. The next step is to determine how much improvement is possible by using special seed and from this to determine how much extra seed cost is economically feasible.

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A Method for Determining Percent Summerwood in Coniferous Wood Samples

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THIS ARTICLE is intended to describe and outline a method or technique of determining the summerwood proportion in round timbers. It is based upon the area of a circle or wedge and, as a result, allows for the circular form of growth rings and the increasing distance from the center of each successive ring. In this respect, the method is believed to be an improvement over linear-type measurements. An important feature is that determinations can be made fairly simply from wood samples of any form as long as they pass through the center of the timber and show all of the individual rings of the timber.

This method resulted from a study initiated by the Woodlands Research Department, Union Bag-Camp Paper Corporation, for the purpose of determining a firmer relationship between cubic foot volume and weight of pulpwood size slash pine trees of specified characteristics growing on specified sites.

The single characteristic thought to be most pertinent to the objective of the study was specific gravity. Determinations of wood specific gravity are not easily made, requiring as they do considerable time and rather specialized equipment. The search for an easier way of obtaining indications of this basic wood characteristic pointed toward use of summerwood proportion as a measure of specific gravity and, also, moisture content. To test this possibility, it became necessary to devise a workable, accurate, and rapid method of measuring the proportion of summerwood in wood samples. And, in keeping with the original intent of the study, the method needed to be applicable to and accurate for round timber.

Three of the most common techniques used for estimating summerwood percent or summerwood-springwood ratio are: (1) a rough, ocular estimate from a cross-sectional wood sample; (2) a linear measurement of the width of summerwood rings on an increment core or other wood section and comparison of the sum of these widths with total length of the sample; and (3) use of a dot grid with discs or wedges cut from discs as sample material.

Obviously, the first technique was not accurate enough for the purpose of this study. Since the second technique does not allow for the circular form of trees and summerwood rings, it, too, was considered unsatisfactory here. This method would work perfectly well when used to calculate the summerwood proportion in objects such as increment cores or boards which contain equal or nearly equal portions of successive rings. Results, however, would apply only to those cores or boards, and not necessarily to the round timbers from which they were extracted. The linear measurement method would give estimates too variable for use in this study, where exact information is required for ground timbers.

The third technique—dot-grid counts of summerwood from discs or wedges—furnishes information of the sort and accuracy needed if a very fine dot grid is used and if the count is repeated several times. Obviously, accurate dot-grid counts are a slow process and a great strain on the counter. The accuracy of the determination would actually decrease if this method were used for continuous and extended periods of time.

Since none of these three techniques seemed adequate for our purpose, the procedure described in the following paragraphs was devised. It accomplishes, we believe, the triple objective of applying to round timber, being adequately accurate, and requiring a minimum of time for the results obtained.

This method of determining percent summerwood is mathematical in nature, and is based upon the cross-sectional area of a wedge or arc. Its basis is the formula for determining the area of an arc, $\pi R^2 \frac{\theta^\circ}{360^\circ}$ where R = total radius and θ° = number of degrees in the arc.

If the area of any arced portion of the wedge is desired, such as the area of a summerwood ring, the area of the wedge to the inner edge of the ring is subtracted from the area of the wedge to the outer edge of the ring (Fig. 1).

The area of the ring can now be expressed as a percentage of the total area simply by dividing the area of the ring by the total area of the wedge and multiplying by 100. In formula form this appears as follows:

1. Percent area in ring =

$$\frac{\pi r_o^2 \frac{\theta^\circ}{360^\circ} - \pi r_i^2 \frac{\theta^\circ}{360^\circ}}{\pi R^2 \frac{\theta^\circ}{360^\circ}} \times 100$$

Simplifying:

$$\frac{\left(\pi \frac{\theta_o}{360^\circ}\right)\left(r_o^2 - r_i^2\right)}{\left(\pi \frac{\theta^\circ}{360^\circ}\right) R^2} \times 100$$

and $$\frac{r_o^2 - r_i^2}{R^2} \times 100$$

where:

R = total radius of arc or wedge,
r_o = radius to outer edge of ring,
r_i = radius to inner edge of ring,
θ° = angle of arc.

As can be seen from the last equation above, the angle of the arc and π no longer enter into the computations; the formula still allows for the circular form of the tree, however, through the squaring of the radii, and can be used with measurements from increment cores as well as wedges in determining proportion of summerwood.

The procedure is basically the same for the many rings of an actual wood sample as for the simplified example presented. It is necessary only to sum the areas of the individual rings or, even more simply, to sum the individual ring-area percents.

The general equation for the percent of total area that is in summerwood rings is:

2.

$$\sum \left(\frac{r_o^2 - r_i^2}{R^2} \times 100 \right)$$

or

$$\frac{\Sigma(r_o^2 - r_i^2)}{R^2} \times 100$$

This formula is particularly adapted to use with a fully automatic calculating machine that is equipped for negative multiplication. The numerator can be calculated on the machine with the final figure representing accumulated differences of squared radii. It is then a simple matter to divide this figure by the total radius squared and multiply by 100 to place it in percentage form.

Although this technique is an improvement over the methods used to date, it is somewhat cumbersome in use. It requires, almost, a calculating machine equipped for accumulative and negative multiplication, as well as a concentration on the part of the machine operator that invites human errors.

Fortunately, the formula can be simplified and rearranged so as to be more workable. Beginning with the general formula for percent of total area in summerwood rings, $\frac{\Sigma(r_o^2 - r_i^2)}{R^2} \times 100$, the percent of total area for any one ring is $\frac{r_o^2 - r_i^2}{R^2} \times 100$.

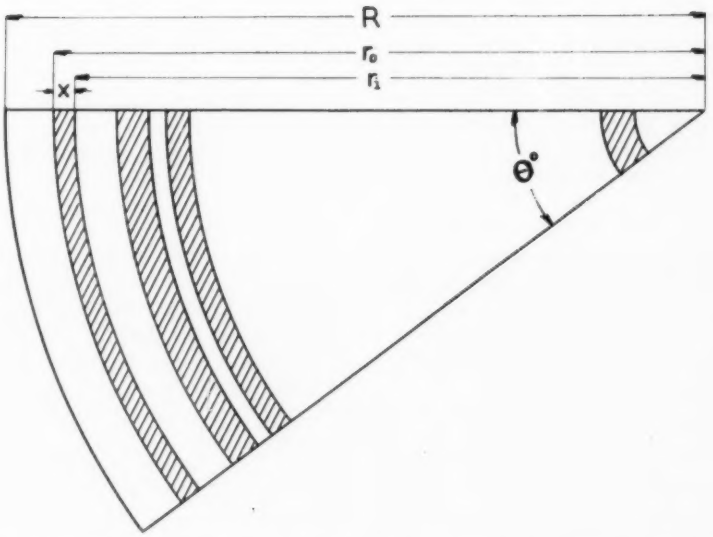

FIG. 1.—Area of rings in a wedge: R = total radius of wedge, r_o = radius to outer edge of ring, r_i = radius to inner edge of ring, x = width of ring, and $\theta°$ = number of degrees in the arc.

3. Factoring, the percent of total area for any one ring =

$$\frac{(r_o + r_i)(r_o - r_i)}{R^2} \times 100$$

From Fig. 1, it is obvious that $r_o - r_i$ = the width of the ring. If we let x = the width of the ring, then: $x = r_o - r_i$ and $r_i = r_o - x$.

Substituting these in the factored formula, (3):

4. Percent of total area in any one ring =

$$\frac{(r_o + r_o - x)x}{R^2} \times 100$$

or

$$\frac{2r_o x - x^2}{R^2} \times 100$$

For the actual wood sample with many rings, the equation would read as follows:

5. Percent of total area in summerwood rings =

$$\sum \left(\frac{2r_o x - x^2}{R^2} \times 100 \right)$$

which simplifies thusly:

$$\frac{\Sigma(2r_o x - x^2)}{R^2} \times 100$$

and becomes, in most workable form, $\frac{2\Sigma(r_o x) - \Sigma x^2}{R^2} \times 100$.

This revised equation will work very handily with any automatic or semi-automatic calculating machine. If r_o is entered on the left side of the keyboard, and x is entered on the right side of the keyboard, both can be multiplied by x in a single operation. For a number of rings $\Sigma(r_o x)$ and Σx^2 can be accumulated on the carriage dials with $\Sigma(r_o x)$ appearing on the left end of the carriage, and Σx^2 appearing on the right end of the carriage. After the sums have been accumulated for all the rings present, $\Sigma(r_o x)$ must be multiplied by 2 and Σx^2 must be subtracted from this product. The result of this operation must then be divided by R^2 and multiplied by 100. This entire final operation, from the point where $\Sigma(r_o x)$ is multiplied by 2 to the point where a division by R^2 is performed, only requires a few seconds with a calculating machine.

The method does not require any negative multiplication, thus reducing the possibility of error; it involves only one operation per ring, which reduces the computational time by one-half; it can be used with any automatic or semi-automatic calculating machine of fairly recent manufacture; and it is reasonably simple to perform.

One additional simplification of formula 2 is possible which works

very well with a fully automatic machine equipped with automatic squaring. In fact, for use with this particular type machine, it requires less time to perform and permits less chance for human error than does formula 5. The general formula for percent of total area in summerwood rings, $\frac{\Sigma(r_o - r_i^2)}{R^2} \times 100$, can be rearranged to read

$$6. \quad \frac{\Sigma r_o^2 - \Sigma r_i^2}{R^2} \times 100.$$

The squares of the outside radii, r_o, can be accumulated on one end of the carriage dials, and at the same time the squares of the inside radii, r_i, can be accumulated on the other end of the carriage dials. This method still requires only one operation per ring, but has a somewhat simpler final operation than formula 5: the difference of the accumulated squares is merely divided by R^2 and multiplied by 100. As was stated previously, however, this method will work most efficiently when using a calculating machine that is fully automatic and equipped for automatic squaring. It is also well adapted to determinations where no calculating machines are available. Where the calculating machine used is semi-automatic or else automatic but not equipped for automatic squaring, formula 5 is by far the most efficient.

Although this technique allows for the circular form of rings, even though the measurements are taken from increment cores, accuracy depends largely upon the following:

1. Degree to which the rings deviate from a circular form. It is believed that in most cases this deviation is small and not significant. However, when it becomes fairly large, it can be mostly compensated for by increasing the number of samples taken from the eccentric area.

2. Degree to which the width of the ring varies around the tree. Again, it is believed that this variation is small and compensating. As with variation of rings from the circular, accuracy here can be improved by increased sampling.

3. Accuracy with which the width of the ring and radius to outer and inner edges of ring can be measured. Much of this depends upon the sharpness of the transition from springwood to summerwood. The same problem would be encountered, however, in any of the methods presently used for determining summerwood proportion. Accuracy as far as this is concerned can be increased only by finer and more elaborate tree-ring-measurement methods and equipment.

4. Random selection of the point of measurement of the rings. Truly random selection of measuring point for a number of samples can improve accuracy by eliminating bias in the measurements.

It is believed that the method for determining percent of summerwood described and outlined here can be of definite value to investigations of this wood characteristic. It should be emphasized that it is a laboratory technique, useful primarily to research workers, and that it applies only to round timbers. Possibly the most valuable feature of the method is that summerwood proportions for round timbers can be calculated using easily-obtained increment cores, with considerable increase in accuracy but without large increases in time and cost.

❦❦❦

Section Box Score
1956 Membership

Section	Applications received[1] Nov. 1956	Total 1955	Total 1956
Allegheny	0	63	42
Appalachian	7	38	33
Central Rocky Mountain	1	12	27
Central States	0	44	19
Columbia River	0	100	58
Gulf States	1	107	61
Inland Empire	2	10	29
Intermountain	0	18	14
Kentucky-Tennessee	0	9	9
New England	0	50	54
New York	1	33	41
Northern California	0	33	47
Northern Rocky Mtn.	1	44	29
Ozark	1	47	19
Puget Sound	1	65	37
Southeastern	1	85	72
Southern California	0	3	1
Southwestern	0	12	2
Upper-Mississippi Val.	0	51	52
Washington	0	2	1
Wisconsin-Michigan	1	40	70
Total	17	866	717

[1]Students, Junior, Affiliate, Associate (Initial) grades only.

School Box Score
1956 Membership

School	Student applications received Nov. 1956	Total 1955	Total 1956
Alabama Poly. Inst.	0	18	6
Univ. of California	0	17	34
Colorado A&M Col.	0	9	24
Duke Univ.	1	3	5
Univ. of Florida	0	17	6
Univ. of Georgia	0	28	30
Univ. of Idaho	0	4	18
Iowa State College	0	22	14
Louisiana Poly. Inst.	1	13	20
Louisiana State Univ.	0	43	13
Univ. of Maine	0	12	13
Univ. of Massachusetts	0	11	13
Michigan State Univ.	0	14	26
Univ. of Michigan	0	21	19
Univ. of Minnesota	0	19	26
Univ. of Missouri	0	26	2
Montana State Univ.	0	25	17
State Univ. of N. Y.	0	23	37
N. C. State College	0	22	3
Oregon State College	0	38	31
Pa. State Univ.	0	32	19
Purdue Univ.	0	24	16
Utah State Agric. Col.	0	12	7
Univ. of Washington	0	28	14
West Virginia Univ.	0	26	5
Yale Univ.	0	16	13
Total	2	523	431

Canadian Institute of Forestry[1]

Jas. D. Coats
Secretary treasurer,
Canadian Institute of Forestry,
Toronto, Ontario

THE CANADIAN INSTITUTE OF FORESTRY is the only national organization representing foresters and others engaged in the forestry field in Canada.

Active under its present name since 1950, the history of the organization dates from 1908. It was in January of that year that F. W. H. Jacombe of the Forestry Branch at Ottawa wrote to A. H. D. Ross of the Faculty of Forestry, University of Toronto, suggesting the formation of a Dominion-wide society of foresters and others prominent in the field of forestry. Dr. B. E. Fernow, dean of the Faculty of Forestry at Toronto, supported the idea enthusiastically and proposed that formative action be undertaken at the ninth annual meeting of the Canadian Forestry Association at Montreal in March.

On March 12 a small committee assembled in Montreal to discuss the proposal that a society of foresters be formed. At that meeting Ellwood Wilson of the Laurentide Pulp and Paper Company moved, seconded by Abraham Knechtel, inspector of Indian reserves for the Federal government, that an organization of the character proposed be formed and that a committee be appointed to draft a constitution. The motion was carried unanimously and Dr. Fernow, who was in the chair, appointed Mr. Jacombe as chairman of the Constitution Committee.

At a meeting held the following evening the members present discussed and, after some minor changes, adopted the constitution prepared by the committee. The name chosen for the new organization was Canadian Society of Forest Engineers. Dr. Fernow was elected president, and Mr. Jacombe was elected secretary-treasurer.

OFFICERS of the C. I. F., October, 1955. *Left*: C. W. I. Creighton, vice president, deputy minister, Department of Lands & Forests, Nova Scotia. *Center*: J. W. B. Sisam, president, dean, Faculty of Forestry, University of Toronto, Toronto. *Right*: W. A. E. Pepler, past president, manager, Woodlands Section, Canadian Pulp and Paper Association, Montreal.

The growth of the newly formed Society continued steadily through the years. When, in 1915, a charter was obtained from the provincial secretary, Province of Ontario, guaranteeing the group exclusive use of their chosen name, there were 72 members. By 1925 there were 204 members, by 1931, 364, and by 1945, 484. Membership increased rapidly during the postwar years to 1,127 in 1950 and 1,456 in 1954. Today there are 1,597 members.

Arrangements were undertaken in 1949 to obtain a Dominion charter through the offices of the secretary of state. A new set of by-laws was prepared in conformance with the Companies' Act. These were voted upon by the membership and on October 28, 1950, the Canadian Society of Forest Engineers became the Canadian Institute of Forestry under a dominion charter. The Ontario charter was subsequently surrendered.

Objects

The objects of the Canadian Institute of Forestry are defined as follows:

1. To encourage a wider understanding of the problems of forestry and improve forestry practice in Canada,

2. To advance the members in their knowledge of the science and practice of forestry and cultivate an esprit de corps within the profession,

3. To publish a technical and scientific journal in the interests of forestry, and

4. To take over and acquire the affairs of the Canadian Society of Forest Engineers, incorporated by Letters Patent issued under hand and seal of the Lieutenant-Gover-

[1] *Editor's note.*—This is the first in a series of four articles dealing with the organization and objectives of technical societies that should be well known to readers of the JOURNAL OF FORESTRY.

nor of the Province of Ontario, under date of September 9, 1915.

Membership

The status of members of the C.S.F.E. was unchanged following the incorporation of the Institute. The qualifications for new members were modified somewhat, however, to ensure the recognition of the Institute as a fully professional body. These qualifications have recently been reviewed by a C.I.F. committee and will, it is expected, be further modified in the near future.

There are four major classes of membership:

Honorary Members are: persons who have made outstanding contributions to the advancement of forestry, and who have been nominated for this class of membership by a unanimous vote of the board of directors, and elected by a simple majority of the members present at an annual meeting of the corporation.

Active Members are: persons who have graduated or who have received a post graduate degree in forestry, forest engineering, or applied science in forestry from colleges or universities recognized by the board of directors as providing courses of satisfactory standing. All members classified as full members in the Canadian Society of Forest Engineers automatically became active members of the Institute.

Affiliate Members are: (1) Persons who, while not graduates in forestry, forest engineering, or applied science (in forestry), have received a degree in an allied branch of science, and who have been engaged in the practice of, or teaching of, or research in some branch of forestry. (2) Persons who, while not graduates of a college or university, have been engaged in the practice of, or teaching of, or research in some branch of forestry for at least five years. (3) Persons who, while not graduates of a college or university, have in the opinion of the Board of Directors indicated interest in forestry, and who are considered to be in a position to contribute to the advancement of forestry principles. All affiliate members in the Canadian Society of Forest Engineers automatically became affiliate members in the Institute.

SECRETARY-TREASURER of the C.I.F. is James D. Coats.

Student Members—Persons registered as undergraduates and proceeding to a degree in forestry, forest engineering, or applied science (in forestry) at any Canadian forest school recognized by the board of directors as providing courses of satisfactory standards leading to such degrees.

Only active members of the corporation are entitled to vote or hold office in the Institute at the national level. At the Section level only the representative to the board of directors need be an active member.

At present there are 9 Honorary, 1,358 Active, 160 Affiliate, and 70 Student members in the Institute for a total of 1,597.

Officers

The officers of the Institute include the president, past-president, vice-president, editor, and secretary-treasurer.

The past-president is that person who has most recently completed a full term in the office of president. He is *ex officio* a member of the board of directors.

Elected for a two year term, the president and vice-president automatically become members of the board upon election to office. The president must preside at all meetings of the board of directors and at the annual meeting of members. He must see that the affairs of the Institute are handled efficiently and in the best interests of the members at large.

The editor has charge of the technical journal *The Forestry Chronicle* which is published quarterly. The *Chronicle* was first published in 1925. It is distributed to the Institute membership and 160 subscribers in various parts of the world.

The secretary-treasurer is responsible for most of the routine affairs such as correspondence, applications for membership, maintenance of membership lists and financial records. He acts as liaison between the Sections and the executive. In addition, he looks after advertising for the *Chronicle* and other project work. He is in charge of the head office of the Institute which is located at 10 Manor Road, West, Toronto, Ontario.

Both the editor and the secretary-treasurer are appointed annually by the board of directors.

Each Section nominates annually a representative to sit on the board of directors for a one-year term.

Sections

There are now 18 Sections of the Institute and two more are being considered. Each Section is managed by a council consisting of a chairman, vice-chairman, secretary, treasurer, the Section representative on the board of directors, and not less than two nor more than five additional members.

Sections vary considerably in numerical strength and in geographical extent. The smallest Section has a membership of 30 members, the largest 197. Most of the Sections hold four or more meetings a year at which the members have an opportunity to discuss local and national forestry problems and to meet socially .The successful functioning of the Institute depends to a great extent upon the initiative and activity of the Sections comprising it.

Standing Committees

The Canadian Institute of Forestry has nine standing committees on technical matters. These are as follows: Entomology and Pathology, Forest Fire, Reforestation, Soils & Site, Silviculture, Surveys, Wildlife, Woodlot Management, and Wood Utilization.

There are also ten standing committees dealing with Institute affairs: Boundaries, By-laws, Code of Ethics, Finance, Membership, Nominating, Resolutions, Section By-laws, Employment, and Accredited Universities.

Over the past few years there has been a total of 21 special committees appointed to investigate and report on particular matters such, in recent years, as The Canada Forestry Act, forest cover types, and Canadian forest research. In February of 1956 a brief prepared by a C.I.F. committee was presented to the Royal Commission on "Canada's Economic Prospects." Other committees have investigated Institute services and administration.

Annual Meetings

Annual meetings of the Institute are generally held in October. They rotate geographically in order that all the members will have an opportunity to get to an annual meeting nearby every few years.

One of the most successful Institute annual meetings was that in Montreal in 1952 when it was held jointly with that of the Society of American Foresters. Another joint meeting of these two groups is being planned for 1961 somewhere in the United States.

Annual Dues

Active members who have been graduated from a university for more than three years pay $10 annually. Active members who have been in the field for less than three years pay $7 as do Affiliate members. Student members pay $3 per annum. Members who retire from their field of employment after fifteen years membership may, upon application to the Board, continue in their respective class of membership without paying dues. They are required to pay $4 per year if they wish to receive *The Forestry Chronicle*.

In addition to the national dues there are the Section dues which range from $1 to $4.

Conclusion

The Canadian Institute of Forestry has contributed very considerably to forestry in Canada. The sectional, regional, and national meetings have served as a meeting ground for government, industrial, and privately employed foresters. Here young foresters have come to know some of the older members of the profession and the opportunity has been provided for foresters to meet with specialists in allied fields.

The accomplishments of the Institute are many. In 1912, for example, a committee was formed to suggest means of standardizing forest maps and many useful procedures have developed from the work initiated by this committee. In 1924 General Sir William Sefton Brancker of the British Air Ministry congratulated Canadian foresters as being the first body of businessmen to make a successful start on profitable commercial flying. In 1940 a "Statement of Forest Policy" was prepared by the Institute. This was reissued in 1947 and was the forerunner of a number of such policy statements issued by many of the wood-using industries. There can be no doubt that this statement stimulated a great deal of interest in forestry in Canada. It underlined the urgent need for much of the forestry legislation which has since been passed in several of the provinces and by the Government of Canada.

Other contributions to forestry include cooperative projects undertaken with the Empire Forestry Association and the Society of American Foresters. The Institute has cosponsored a Natural Resources Conference in Ottawa (1954) and a National Forestry Conference in Winnipeg September, 1956.

Individual Sections have made worthy contributions, too. The Sections in British Columbia recently submitted a brief to the Royal Commission investigating forestry in that Province. The Rocky Mountain Section submitted an excellent brief on forest fire to the Government of Alberta. Other Sections have conducted vocational guidance programs, school lectures on forestry, reforestation projects, newspaper releases—all aimed at making the Canadian public aware of the great forest resource with which she has been so bountifully endowed.

A great deal has been done but there is still much more needed if the foresters of Canada and their friends in related fields are to fulfill their purpose. Canada is growing rapidly. The position she attains among the nations of the world will depend in large measure upon the wisdom with which she manages her forest resources. The Canadian Institute of Forestry is anxious that those in the field of forestry do their part in shaping the destiny of Canada.

Correction

In the article "Stand establishment costs and the theory of relative forest rent" by Rudolfs Markus, Vol. 54: 503-504, August, 1956, the author was incorrectly indentified as a former director of the Latvian forest research institute. Dr. Markus was formerly dean of the Faculty of Forestry, Agricultural Academy in Jelgava. P. 504, col. 3, lines 34 and 35: "Statistically . . ." should read "Statically . . ."

Aerial Application of Potash Fertilizer to Coniferous Plantations[1]

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THE LARGE acreages, rough terrain, and difficulty of access in many forest areas have made the use of aircraft necessary and frequently the only feasible approach to many forest management problems. Air transport is now commonplace in such forestry activities as fire detection and suppression, insect and brush control, reseeding, surveying, reconnaissance, and many administrative functions. Recent experiments in New York (*6*, *17*) and elsewhere (*4*, *10*, *21*) indicate that deficiency of the major plant nutrients may frequently occur on important forest areas in the United States and Canada. Moreover, these deficiencies may often be corrected by applications of commercial fertilizers. Under certain conditions use of aircraft may provide the only practical technique for applying these materials to forest land. This report describes a successful aerial application of potash fertilizer to over one hundred acres of coniferous plantations in New York.

Use of Fertilizers in Forestry

The use of fertilizers in forest practice has been investigated for many years and recommendations for their use in forestry are almost as old as the general use of commercial materials in agriculture (*7*). From the physiological standpoint, investigations on the nutrition of forest trees have clearly established the natural occurrence of a deficiency of all the major nutrient elements and some of the minor elements (*1*, *5*). Reports from every continent have shown significant increases in growth and volume production as a result of fertilizer application. The possibility of using fertilizers to stimulate forest production offers promise as a silvicultural technique (*13*, *12*, *18*, *19*).

Until quite recently several characteristics of forest management in the United States and Canada, particularly low economic returns per acre and relegation of forest production to the poorer sites, has in the main precluded the use of fertilizers for the improvement of volume production. European conditions, with a different economic base and particularly low labor costs and scarcity of wood products have provided a more favorable atmosphere for a long continued interest in the possibility of stimulating wood production by the use of soil amendments (*3*, *14*).

In recent years and especially since World War II, there has been a widespread renewal of interest in forest fertilization. This reversal of the established concept of the "impracticability of fertilizing forest stands" is primarily due to the rapidly changing economic picture in forest land use and a general betterment of both national and international economic conditions. In North America many of the plantations and old field stands which came into being as a result of mass agricultural land abandonment in the early part of this century are now approaching merchantable size. Unfortunately a number of these stands have inherited the ills attendant on agricultural exploitation and are now in a stagnating or checked condition. Afforestation of heaths, peat lands, old burns and other nonproductive areas in many parts of the world present similar nutritional problems (*8*, *11*, *16*).

Application Techniques

Once the response to fertilization has been significantly demonstrated by field plots or implied by foliar or visual diagnosis, the difficulty of applying the material to forest stands or plantations uniformly and efficiently presents an important problem on which the feasibility of the practice may depend.

Hand broadcast application or the use of small mechanical spreaders may be used on small areas and particularly in young, open plantations. On large acreages, rough terrain or closed stands, the use of ground transportable equipment is severely limited. Recent trials of a power blower operating from cut lanes or existing roads have not been satisfactory (*22*). The solution to this problem logically suggests the use of aircraft. Fertilizer application from aircraft is relatively expensive (2-4 cents/pound)[2] because of high operating costs and relatively small pay loads. However, aerial fertilization is frequently used in agriculture (*15*) and finds its principal application when ground equipment cannot be used, as on cranberry bogs, rice fields, wheat fields (during periods of high soil moisture), rough or inaccessible pastures, and close growing crops.

[1]Contribution from the Department of Silviculture, State University of New York College of Forestry in cooperation with the New York State Conservation Department and the American Potash Institute. Prof. Svend O. Heiberg and Supt. of State Forests C. D. Kingsbury gave valuable assistance in the planning of this project and review of manuscript. Karl Wolter and Dieter Kutscha assisted with chemical analyses.

[2]R. Ward, Central Aircraft, Yakima, Wash., Personal Communication.

New York Fertilizer Trials

The description of strong and persistent (20 years) response to potassium fertilization of coniferous plantations by Heiberg and White (*6*) stimulated considerable interest in the possibility of treating the rather large areas of plantations on old field soils where the condition is most likely to occur. Foresters of the New York State Conservation Department,[3] faced with the problem of stimulating growth on many thousands of acres of state plantations, offered the use of an aircraft and field assistants, and the American Potash Institute offered to furnish materials of suitable quantity and grade for the trials.

In cooperation with state foresters, approximately 100 acres of coniferous plantation located in ten different blocks, nine in Lewis County, and one in Oneida County, were selected for aerial fertilization with granular muriate of potash (60% K_2O) in the early summer of 1954. It would have been desirable to apply the material a month earlier, but this was impossible because the aircraft was committed to insect control operations. Details of block location, area and species are included in Table 1. Preliminary soil (Adams-Colton Association) and tissue analysis as well as visual symptoms indicated a low level of soil potassium although not as severe as the conditions reported by Heiberg and White (*6*) for glacial outwash soils (Hinckley series) in the upper Hudson River Valley.

Aircraft and Spreader Equipment

Most aircraft engaged in distributing agricultural chemicals are single-engine biplanes with open cockpits affording maximum stability and visibility in low level flight. Helicopters, although in many ways ideally suited for this purpose, are as yet precluded from this kind of operation because of low pay load and a high maintenance cost. Although special aircraft have been designed for fertilizer application,[4] a Stearman 1B75A and experienced pilot available from the Conservation Department were used. The plane, normally used for insect spray operations by the state's Bureau of Forest Pest Control, is equipped with a front mounted, plastic-lined hopper which can be used for liquid or solid materials. The capacity of the tank is 200 gallons and easily holds the maximum load of 1,400 pounds of fertilizer as prescribed by CAA regulations. For fertilizer application the spray boom was disconnected and the material disseminated from a split-tail Venturi-type spreader[5] mounted beneath the fuselage (Fig. 1). Two adjustments are possible to regulate the rate of flow. A hand-operated hopper gate is controlled by the pilot in flight. The gate can be adusted to ¼, ½, ¾ or full open, but in practice the pilot does not have time to select the degree of opening during the strips of an application run, so that this lever

[3]A number of N.Y.S. Conservation Department employees gave valuable advice and assistance during the course of these trials including C. D. Kingsbury, C. J. Yops, F. Jadwin, A. Roberts, C. Voll, D. Lum, W. Masterson, R. Mason (pilot), J. Homiak, and others.

[4]Central Aircraft, Yakima, Wash.
[5]Transland Co., El Segundo, Calif.

TABLE 1.—SUMMARY OF AERIAL APPLICATION OF GRANULAR MURIATE OF POTASH TO LEWIS AND ONEIDA COUNTY, NEW YORK PLANTATIONS, JUNE 30-JULY 1, 1954

Plantation								
Reforestation area[1]	Plot No.	Proposition No.	Species	Area	KCl	Calculated rate	Measured rate by collection	Remarks
				Acres	*Lbs.*	*Lbs./acre*	*Lbs./acre*	
4	1	13M	Red pine	14.0	2,000	150	132	Hopper lever at ¼ position.
4	2	16, 18M	Red pine, Norway spruce, Scotch pine (nat. repro.)	6.5	1,000	154	....	Hopper lever advanced to point halfway between ¼ and ½ open for this and subsequent runs.
4	3	N	Red pine	2.5	460	184	....	
4	4	N	Red pine, white pine, European larch	26.5	3,340	126	....	Gross acreage includes several open areas which pilot tried to cut out for. Actual application rate is probably higher than calculated rate.
3	1	B	Red pine, white spruce	10.2	2,100	203	113	Low collection rate attributed to heavy dew at 6:00 a.m. making complete collection from containers difficult.
3	2	I	Red pine, white pine	19.2	4,200	219	193	Collection from containers in openings. Dry conditions permitted more complete recovery of fertilizer from containers.
3	3	C	Red pine	2.9	700	243	....	
3	4	Oneida County	Red pine, white pine, white spruce	12.9	2,800	217	....	
3	5	I	White spruce, white pine	14.6	2,700	185	....	
			Total	109.3	19,300	....	....	
			Average rate	....	....	177	....	

[1]4—Lake Bonaparte, N. Y.—U.S.G.S.: Aerial Mosaic 94-1-GU(283A)
3—Port Leyden, N. Y.—U.S.G.S.: Aerial Mosaic NY-D-18-30

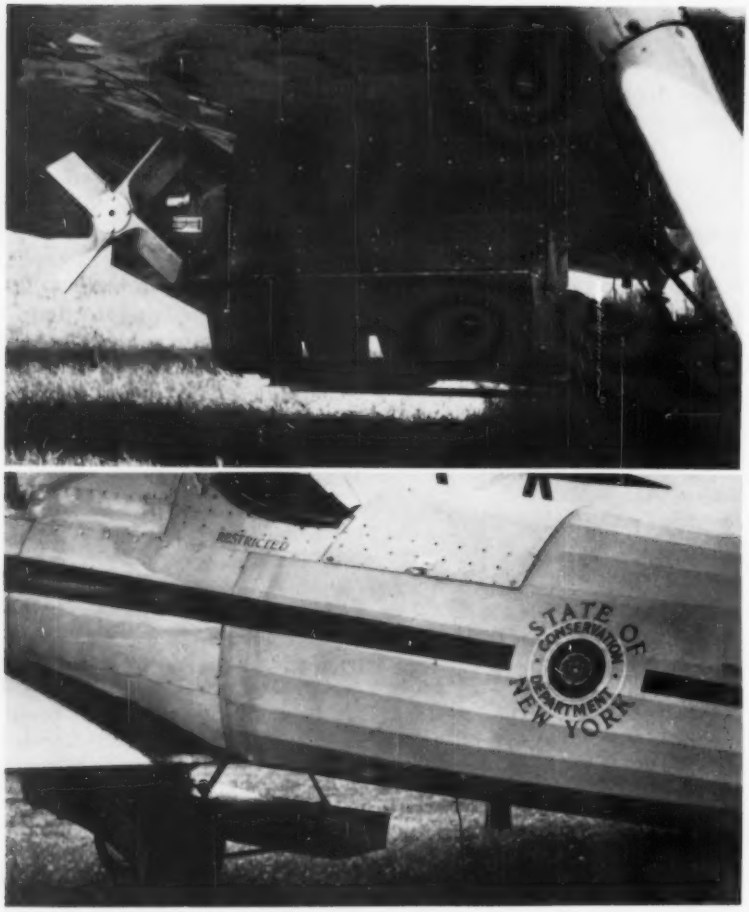

FIG. 1.—Spreader used in fertilizer application mounted on a Boeing Stearman 1B75A plane. *Upper:* front view of spreader showing small prop which activates hopper agitator. *Lower:* rear view of split-tail Venturi-type spreader used for fertilizer application.

must be preset to the desired opening before treating a particular block. The Venturi slot can also be adjusted, but this would be determined by kind and application rate of material and must be set before take-off.

Type and Grade of Material

Solid materials distributed by air require carefully controlled conditions to insure a satisfactory spread (*2*). Finely powdered materials tend to drift badly even under the best of conditions. Material with a wide range of particle sizes such as is frequently found in "mixed goods" will stratify in the hopper even though it is supplied with an agitator. Moreover, after leaving the spreader, the various particle sizes separate in the air stream, and the finer materials drift more seriously than the coarser particles. The most desirable material is a nonhygroscopic, uniformly sized, rounded pellet as found in some specially prepared nitrogen carriers and also some of the newer complete fertilizers.

In the experiments reported here, a granular grade of muriate of potash (60%, K_2O) was used in preference to the usual fine-grained muriate found in the trade. This granular grade,[6] comprising 92 percent particles between 28 and 6 mesh (.84-3.36 mm), looked like a fine rock salt. It had the advantage of containing very little finely ground particles which minimized drift. In addition, the larger particles gave little or no trouble with hygroscopicity. The hopper emptied completely, and there was no caking in the bags.

Distribution and Flight Characteristics

Results of previous studies as well as general agricultural experience indicated the desirability of an application rate of 200 lbs./acre of 60 percent muriate (*6*). In order to achieve this target rate, or any other rate, it was necessary to empirically calibrate the spreader under simulated operating conditions with the material to be applied.

From the previous experience of the pilot and ground crews it was known that calm to gentle wind conditions (0-5 mph) at the ground were necessary to avoid excessive drift. Moreover, air turbulence at higher velocities make tree-top level flight hazardous and too erratic for maximum efficiency. Air speed of 100 mph is necessary with this type of aircraft for safe maneuverability at low levels. Application was made at an elevation of 25-50 feet with the wheels just clearing the tops of the trees.

Calibration

Measurement and control of the distribution rate in an aerial drop requires some sort of a collection container for the trial runs. In this study standard metal waste baskets 16 in. high with a 1 sq. ft. opening were selected. With containers this size there was no bounce of the material out of the container and sufficient quantity was collected for convenient field weighing.[7]

Thirty-six collection baskets were distributed in a 60x20 ft. rectangular pattern along the center of the grassed airstrip at Croghan, New York, which served as a base for all the field plots. During the calibration runs the aircraft flew down the center of the collection area. Ground observers stationed along side of the airstrip where they could be seen easily by the pilot signalled for cut in and out

[6] Potash Co. of America, Carlsbad, N. M.

[7] 1 gm in the container is approximately equal to to 100 lbs./acre.

of spreader. After each run the material collected in the baskets was transferred to paper bags and weighed on a portable field balance.

Several short calibration flights established approximate hopper opening and indicated that the bulk of the material was laid down in a 60 ft. wide swarth with a clearly defined maximum directly under the aircraft, and rapidly falling off on each side.

By the fourth calibration run with hopper ¼ open, the collection baskets contained almost the equivalent of a 150 lbs. per acre rate directly under the aircraft (Fig 2). It was estimated that, by using 40 ft. wide swaths the overlap would approximate a uniform application of somewhat in excess of 150 lbs. per acre under the same operating conditions. This is similar to the calibration technique used by Lynch (9) in applying phosphate to New Zealand pastures by air. Estimating some over-run on account of inability to recover all the fine material from the collection baskets for weighing, it was decided to check the calibration in an actual application flight. This decision to chance the accuracy of the calibration estimate in actual practice was necessitated by the limited period during which the aircraft was available and the possibility that high wind forecasts might require complete cancellation of the trials. Calculated and actual collections during the first two flights checked out the calibration as delivering about 50 lbs. per acre under the desired level. The hopper lever was then advanced to a point mid-way between the ¼ and ½ mark for the balance of the treatments.

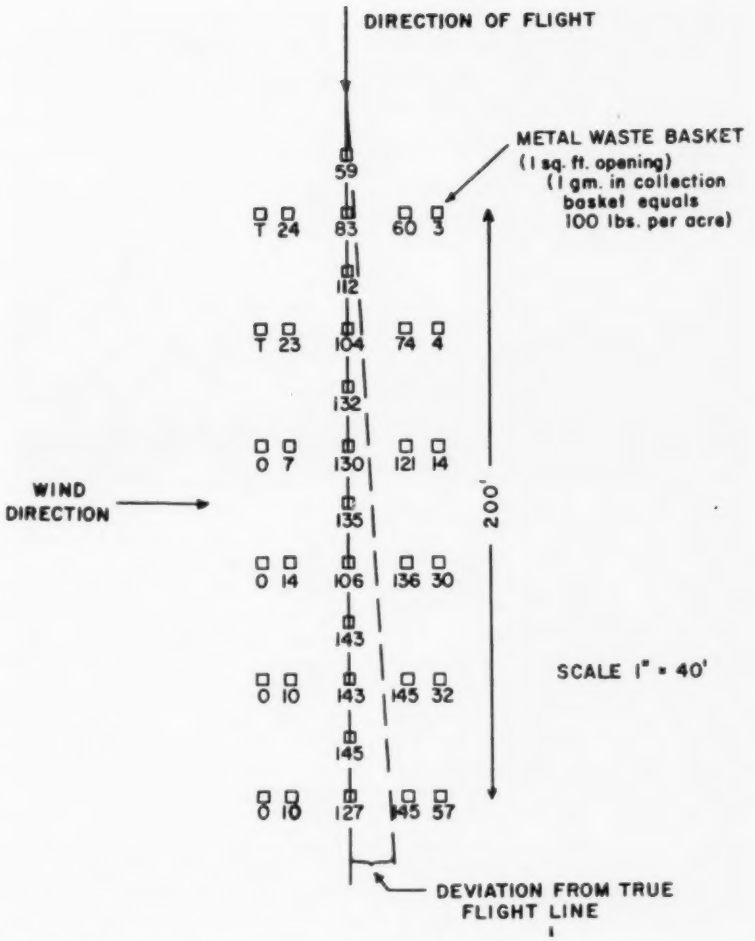

FIG. 2.—Rate of potash application—final calibration run (pounds per acre) Croghan Airport. June 30, 1954.

Aircraft height—25'-50' Hopper lever—¼ open
Venturi slot—narrowest opening Scale: 1" = 40'

Application of Fertilizer to Plantations

Within a few hours after calibration calculations were completed, the first plot was treated by air. During the next day and a half twelve application flights were made and over 100 acres treated. The details of the plot treatments are summarized in Table 1.

In maintaining ground control of the treatments, point-to-point radio telephone communication between the air strip and the field plots was maintained by mobile equipment operated by personnel of the New York State Forest District No. 6. Air-to-ground communication was not available; this presented some inconvenience and delay and in any large-scale operation this facility should be provided.

In applying the granular potash there is no visible dust to guide pilot in alignment. The center line at the beginning and the end of each strip was marked by a ground crewman holding a 30 ft. aluminum pole with a muslin wind sack attached to the top (Fig. 3). The markers were moved to the next center line while the plane was turning for the next run.

Calculation of the rate based on acreage and amount distributed revealed a very good approximation of the desired 200 lbs. per acre level.[8] Only one plot out of the nine fell below the acceptable standard, and even this may be satisfactorily explained in that the gross acreage used in calculating application rate includes a number of open areas for which the pilot cut off the spreader.

[8]At the beginning of the experiment it was felt that an actual deviation of 50 lbs. from the target level would be considered satisafctory.

The average calculated rate for all the plots (Table 1) was 177 lbs. per acre which is considered to be quite satisfactory for the technique used.

An attempt was made to check the calculated application rate by collecting random samples from some of the treated plots in collection baskets as used in the calibration runs. Time, closed crown canopy, and dew interfered with the completion of a good field collection check during the first day. Since the calculated rate was checking out fairly closely, the tests were continued with the same flight conditions and finally a pattern of twelve sample containers on plot 3/2 gave an average distribution of 193 lbs. per acre with all container collections containing quantities within the specification standard of 200 lbs. per acre ± 50 lbs.

Observers standing within the plots at the time of treatment reported good to excellent visual distribution of the material after the flights. Wherever buckets or baskets were placed within the plots or bare spots and areas of moss permitted good visual checks, there was always a quantity of fertilizer in the container or on the ground, so that virtually every square foot of the area got some of the material. Crown interception of the coarse material was very slight and of no importance with respect to burning of the foliage. Of particular significance was the ability of the pilot to cut the applicator in and out between strips to eliminate any important distribution of the material outside of the plots.

Applicability of Technique

A summary of flight statistics is appended to Table 2 which reveals the coverage potential of this method. Even with irregular blocks and short runs the average treatment rate was 4.7 minutes per acre including travel time to and from the airstrip. This type of aircraft in treating larger blocks at a similar rate where the entire load might be spread in a single strip could treat 6 acres in one minute of actual distribution time.

The important limiting factors in any large-scale operation would be favorable wind conditions and distance between airstrip and stands to be treated. In practice temporary strips could be bulldozed out near the area and the material trucked almost to the application point. Consequently it would be possible for several aircraft working in cooperation to make at least three runs per hour including loading, application and travel. This would accomplish 42 acres per hour with two ships. Even with only a few calm hours in the early morning and evening it should be possible to treat several hundred acres a day.

The results obtained with this potash application should be fully applicable to other kinds of fertilizer with similar physical characteristics.

Observations of Plantation Response to Treatment

A visual inspection was made of all the treated plots in October 1954. The results after a single growing season were quite striking.

TABLE 2.—FLIGHT RECORD—AERIAL FERTILIZATION
JUNE 28-JULY 1, 1954

Date	Flight No.	Take off	Landing	Duration	Loading	Fertilizer	Gas	Oil	Plot No.	Remarks
		a.m.	a.m.	*Min.*	*Min.*	*Lbs.*	*Gal.*	*Qts.*		
6/28/54	1	8:00	8:05	05		200			Airport	Calibration
	2	8:30	8:35	05	30	100			"	"
6/30/54	1	5:40	5:45	05	....	200			"	"
	2	5:55	6:00	05	10	200			"	"
	3	10:45	11:00	25	....	1,000			4/1	Application
	4	11:25	11:50	25	25	1,000			4/1	"
		p.m.	p.m.							
	5	12:10	12:40	30	20	1,000	20		4/2	"
	6	12:50	1:25	35	10	1,400		4	4/3, 4/4	"
	7	1:35	2:05	30	10	1,400			4/4	"
	8	2:20	2:40	20	15	400	20		4/4	"
							20	6		
		a.m.	a.m.							
7/1/54	1	5:50	6:25	35	....	1,400			3/1	"
	2	6:40	7:20	40	25	1,400			3/1, 3/2	"
	3	7:35	8:15	40	15	1,400	30	4	3/2	"
	4	8:35	9:10	35	20	1,400			3/2	"
	5	9:25	10:05	40	15	1,400	25		3/2, 3/3	"
	6	10:25	11:00	35	20	1,400		4	3/4	"
	7	11:10	11:25	15	10	600			4/4	"
		p.m.	p.m.							
	8	5:25	6:05	40	....	1,400			3/4	"
	9	6:15	6:50	35	10	1,400	15		3/5	"
	10	7:00	7:30	30	10	1,300	20	6	3/5	"
Total	20			530	245	20,000	150	24		

Summary of Flight Record (exclusive of calibration runs):

No. flights	16	Av. speed aircraft	100 mph
Elapsed time	510 minutes	Av. height	25-50'
Av. flight	32 minutes	Maximum load (CAA Reg.)	1440 lbs.
Av. treatment time/acre including travel	4.7 minutes	Aircraft Stearman	1B75A
Est. actual treatment rate in level flight without travel or turns	6 acres/minute	Fertilizer spreader:	Transland #S-1105-110
		Venturi Slot—narrowest opening	
		Hopper lever—btw. ¼ and ½ open	

White spruce (*Picea glauca*), Norway spruce (*Picea abies*), white pine (*Pinus strobus*), and red pine (*Pinus resinosa*) all showed a definite color response to the treatment with an increase in needle length and foliage production as compared with the control areas. Shoot growth of red and white pine was also increased on the fertilized plots (Fig. 4). On plot 4/2 which has some sand blow holes and also some natural reproduction of Scotch pine (*Pinus sylvestris*) the indications of magnesium deficiency on Scotch and red pine which were apparent before treatment seemed to be accentuated. This is in accord with observations by Stone (*17*) on the same area that potash fertilization alone tends to accentuate the symptoms of magnesium deficiency.

In November 1955 current needle tissue from six of the nine plots and adjacent control areas was collected for foliar potassium analysis. Soil samples representing a composite of 20 Ap horizon cores from each of the treated and control areas were also collected. Sampling and analytical technique was similar to that described by White (*20*). The results of these analyses and including samples collected in a similar manner during a pretreatment reconnaissance of the same area in the fall of 1953 are reported in Table 3.

FIG. 3.—Guiding pilot in alignment during aerial application of fertilizer. Center line at beginning and end of each strip was marked by a ground crewman holding a 30 ft. aluminum pole with a wind sack attached to top.

The results from analysis of samples collected two growing seasons after treatment clearly indicate a significant increase of 20 to 77 percent in foliar potassium in all the treated areas over the control. Moreover, foliar levels in the plots as measured before treatment in 1953 and in the post treatment controls are quite similar. In all cases the increase in the level of available K in the soil as a result of the treatment was still apparent. The levels of foliar K and exchangeable K in soil on Area 4 are generally at the same extreme deficiency level of some of the plantations reported by Heiberg and White (*6*). The values reported for Area 3 are still on the borderline where response to K fertilization should be expected. In all of the plots a clear response to application based on improvement in

FIG. 4.—Increase in shoot growth of red pine (*left*) and white pine (*right*) one growing season after aerial potash application. Untreated shoots are at extreme left and right.

TABLE 3.—INCREASE OF FOLIAR AND SOIL POTASSIUM FOLLOWING AERIAL FERTILIZATION

Plot No.	Species	Potassium in Current Needle Tissue[1]				Exchangeable Soil Potassium[2]			
		Control		Treated	Increase	Control		Treated	Increase
		1953	1955	1955		1953	1955	1955	
		Percent				*ppm*		*ppm*	*Percent*
4/1	Red pine	.336	.314	.377	20	6.3	8.9	13.6	53
4/2	Red pine	.305	.240	.424	77	—	7.3	12.1	66
	Norway spruce	——	.519	.718	39				
4/3	Red pine	.241	.278	.438	57	8.9	17.0	29.6	67
3/1	Red pine	.334	.334	.448	34	8.7	18.3	27.0	48
	W. Spruce	.388	.384	.621	62				
3/2	Red pine	.241	.318	.409	25	8.3	12.6	35.3	118
	W. pine	.330	.359	.509	42				
3/5	W. spruce	——	.363	.541	49	—	14.2	34.4	104

[1]Av. value of duplicate analyses of three sample collections. Each sub-sample comprises combined tissue from lateral branch taken from north side of upper crown of three trees in late fall.

[2]Av. value of duplicate analyses of composite Ap horizon sample. Each sample comprises 20 random cores from 0-6" depth at time of needle collection.

needle color and length was apparent.

Conclusions

Improved growth coupled with increased foliage and soil potassium levels clearly indicates that the treatment was effective in stimulating increased physiological activity in the stands. Of more direct import in this experiment was the uniform and consistent distribution of the fertilizer by the aerial application technique. These experiments showed that an application rate of 200 lbs. per acre could be achieved readily with the equipment used.

It should be remembered that this was not a study of the economics of the practice. However, the experience gained here suggests that treatment of large plantation areas by this aerial method at this rate would require a material cost of $5.00 per acre at 1956 levels, and a maximum application cost of $8.00 per acre. This investment of $13.00 per acre in a silvicultural operation which might double growth rates over the next five years seems to be economically sound, wherever significant nutrient deficiency exists and where size of area or difficulty of terrain precludes the use of ground equipment.

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Bias in Timber Volume Estimates Caused by Rounding off D.B.H. and Merchantable Length Measurements

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INDIVIDUAL tree measurements are the basis for timber volume and growth estimates. To determine the possible error introduced when tree diameters at breast height and merchantable log lengths are rounded off to nominal sizes, a study was made of all the forest survey sample tree data collected on inventory plots in Iowa.

Diameters

For convenience in handling data, trees are frequently grouped by 2-inch diameter classes. The 12-inch class, for example, usually includes all trees from 11.00 inches through 12.99 inches, with the mid-point assumed to be 12.00 inches. In a typical all-age forest such as Iowa's total tree population, however, the number of trees decreases as diameter or merchantable length increases. Thus, for any interval between diameters or lengths more trees will probably be in the lower part of the ranges than in the higher part. Hence the assumed mid-point of 12.00 in the above example is likely too high.

An analysis of 1,462 hardwood sample trees measured to the nearest 0.1 inch indicated that for all trees 6 inches d.b.h. and larger, the actual 2-inch class mid-points are nearly always closer to the next lower 0.1 than to the assumed middle diameter. Pole timber trees (6, 8, and 10 inches d.b.h.) as a unit average close to N.95 ("N" is one less than the assumed diameter class mid-point "M"). On the other hand, saw timber trees (12 inches d.b.h. and larger) average nearer N.90 (Table 1).

Since the measurement of tree diameters to the closest 0.05 inch is impractical, the tally must be made either by 1- or 2-inch classes, or to the nearest 0.1 inch. For this particular sample no bias is apparent in pole timber volume, because an average of N.95 could just as well be rounded up to M.00 as down to N.90.

TABLE 1.—ACTUAL DIAMETER CLASS MID-POINTS OF HARDWOOD TREES IN ALL-AGE STAND, BY D.B.H. CLASSES

2 inch d.b.h. class	Average d.b.h.	Trees measured
	Inches	*Number*
6	5.944	104
8	7.990	59
10	9.944	32
12	11.935	451
14	13.863	304
16	15.944	186
18	17.812	124
20	19.945	88
22	21.886	49
24	24.055	29
26	25.883	18
28	27.722	18
Total		1,462

On the other hand, the error for all trees could be minimized either by tallying diameters to the nearest 0.1 inch (to get the true class means) or by assuming a mid-point of N.90 for all d.b.h. classes. After tallying trees to 0.1-inch diameters and making appropriate interpolations in an International 1/4-inch volume table, it was found that the net board-foot volume based on the assumed average d.b.h. had been overestimated by 1.19 percent (Table 2).

Since the number of logs per tree was held constant, the volume differences could be approximated through use of the formula:

$$X = 200\left(\frac{D-d}{d}\right)$$

Where X = Percent volume difference within d.b.h. class
D = Actual diameter class mid-point, inches
d = Assumed diameter class mid-point, inches

Thus for the 20-inch class,

$$X = 200\left(\frac{19.94-20.00}{20.00}\right) = \frac{12}{20} = -0.60 \text{ percent}$$

and for the 24-inch class,

$$X = 200\left(\frac{24.06-24.00}{24.00}\right) = \frac{12}{24} = +0.50 \text{ percent}$$

Log Lengths

Length of stem to the estimated limit of merchantability is usually tallied to the nearest half-log, or 8-foot section. For 1,267 sawtimber sample trees in Iowa, the estimated merchantable length, in feet, was also measured to the closest foot with an Abney level (Table 3).

Trees tallied in the 1/2-log class had an average merchantable length which was considerably longer than the assumed length of 8 feet. This is inevitable because, by definition, a tree with a merchantable length of less than 8 feet is not considered merchantable. Thus, lengths shorter than 8 feet can never compensate for lengths longer than 8 feet.

The other log-length classes had average merchantable lengths that were somewhat shorter than the assumed averages. Again interpolating in an International 1/4-inch volume table, it was found that the total net board-foot volume based on the assumed average length had been overestimated by 0.92 percent (Table 4).

Summary and Conclusions

A study of 1,462 sample trees measured on forest survey plots in Iowa showed that grouping trees by 2-inch diameter classes, and by half-log lengths, caused overestimates of board-foot volume of 1.19 percent and 0.92 percent, respectively. This bias resulted from the

[1]Forest Service, U. S. Department of Agriculture. The Station is maintained at St. Paul 1, Minnesota in cooperation with the University of Minnesota.

TABLE 2.—BOARD-FOOT VOLUMES OF TREES TALLIED BY 2-INCH D.B.H. CLASSES VERSUS VOLUMES OF TREES TALLIED TO NEAREST 0.1 INCH

2-inch d.b.h. class (inches)	Sample trees	Average logs per tree[1]	Tallied by 2-inch d.b.h. class: Assumed class mid-point	Tallied by 2-inch d.b.h. class: Average volume per tree	Tallied by 2-inch d.b.h. class: Total volume	Tallied by 0.1-inch d.b.h. class: Actual class mid-point	Tallied by 0.1-inch d.b.h. class: Average volume per tree	Tallied by 0.1-inch d.b.h. class: Total volume	Difference: Within d.b.h. class	Difference: Related to total volume
	Number	*Number*	*Inches*	*Bd. ft.*	*Bd. ft.*	*Inches*	*Bd. ft.*	*Bd. ft.*	*Percent*	*Percent*
12	451	1½	12.00	80	36,080	11.94	79.28	35,755	−0.90	−0.18
14	304	1½	14.00	110	33,440	13.86	108.04	32,844	−1.78	−0.33
16	186	1½	16.00	147	27,342	15.94	145.86	27,130	−0.78	−0.12
18	124	1½	18.00	188	23,312	17.81	183.82	22,794	−2.22	−0.29
20	88	1½	20.00	236	20,768	19.94	234.56	20,641	−0.61	−0.07
22	49	1½	22.00	290	14,210	21.89	286.92	14,059	−1.06	−0.08
24	29	1½	24.00	346	10,034	24.06	347.80	10,086	+0.52	+0.03
26	18	1½	26.00	410	7,380	25.88	405.92	7,307	−1.00	−0.04
28	18	1½	28.00	480	8,640	27.72	468.80	8,438	−2.33	−0.11
All diameters	1,267				181,206			179,054		−1.19

[1]The number of logs per tree was held constant to bring out the effect of the difference between the actual and assumed d.b.h. mid-points. The same percent difference in volume would generally hold for other log lengths.

uneven-aged distribution of Iowa's entire tree population could be minimized by measuring d.b.h. to the nearest 0.1 inch and merchantable length to the nearest foot. In this particular case no correction was made because the difference was less than the sampling error computed from the less exact measurements.

TABLE 3.—ACTUAL AVERAGE MERCHANTABLE LENGTH PER TREE IN EACH LOG-LENGTH CLASS

Log-length class	Merchantable length per tree: Assumed	Merchantable length per tree: Actual	Trees measured
	Feet	*Feet*	*Number*
½	8	9.54	185
1	16	15.68	477
1½	24	23.17	336
2	32	31.26	180
2½	40	39.29	58
3	48	47.58	24
3½	56	53.71	7
Total			1,267

Although accuracy of field work is a primary requisite of a good cruising job, ease and speed of data collection are also important. This latter requirement can be readily fulfilled because tree diameters can be measured and tallied to the nearest 0.1 inch, instead of by 2-inch classes, with very little additional field effort. However, the volume computations become much more complex. Similarly, merchantable lengths can be estimated to the nearest foot and appropriate volume tables constructed, but this refinement may be difficult to justify because the measurements are to a top that is only theoretical. Volume estimates are also affected by other factors, such as personal bias of the field men, which were not evaluated in this particular study.

Discrepancies due to grouping diameters and log lengths might possibly become significant in more intensive surveys. The probable solution is not to measure every inventory tree with greater accuracy but to use a sample of accurately measured trees to detect deviation from nominal values. Correction factors could then be applied to volume estimates.

TABLE 4.—BOARD-FOOT VOLUMES OF TREES TALLIED BY ½-LOG LENGTHS VERSUS VOLUMES OF TREES TALLIED TO THE NEAREST MERCHANTABLE FOOT

8-foot log-length class (feet)	Sample trees	Average d.b.h. per tree[1]	Tallied by 8-foot log-length: Assumed log length	Tallied by 8-foot log-length: Average volume per tree	Tallied by 8-foot log-length: Total volume	Tallied to the nearest merchantable foot: Actual log length	Tallied to the nearest merchantable foot: Average volume per tree	Tallied to the nearest merchantable foot: Total volume	Difference: Within log-length class	Difference: Related to total volume
	Number	*Inches*	*Feet*	*Bd. ft.*	*Bd. ft.*	*Feet*	*Bd. ft.*	*Bd. ft.*	*Percent*	*Percent*
8	185	15	8.00	50	9,250	9.54	58.08	10,745	+16.16	+1.05
16	477	15	16.00	92	43,884	15.68	90.32	43,083	− 1.83	−0.57
24	336	15	24.00	128	43,008	23.17	124.26	41,751	− 2.92	−0.88
32	180	15	32.00	160	28,800	31.26	157.04	28,267	− 1.85	−0.37
40	58	15	40.00	188	10,904	39.29	185.52	10,760	− 1.32	−0.10
48	24	15	48.00	214	5,136	47.58	212.64	5,103	− 0.64	−0.02
56	7	15	56.00	232	1,624	53.71	226.85	1,588	− 0.22	−0.03
All lengths	1,267				142,606			141,297		−0.92

[1]The d.b.h. was held constant for all log-length classes to bring out the effect of the difference between actual and assumed average log lengths. The same percent difference in volume would generally hold true for other d.b.h.'s.

Slash Disposal and Seedbed Preparation by Tractor

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CREATING GROUND conditions favorable to regeneration immediately after the final harvest cutting is basic to forest management wherever advance growth is deficient. Ponderosa (*Pinus ponderosa* Laws) and Jeffrey pine (*Pinus jeffreyi* Grev. & Balf.) seeds require bare mineral soil for satisfactory germination. Pine seedlings, whether from natural seedfall or planting, survive and grow vigorously only when free from competition with other vegetation.[2,3] This article describes methods used and reports the cost of site preparation in recent years at the Blacks Mountain Experimental Forest in northeastern California and the Stanislaus Experimental Forest in the central Sierra Nevada. Performed as one step in the harvesting and regeneration of experimental areas, the operation cost $37 per acre in 1955, or less than 25 cents per thousand board feet harvested.

Site preparation requires the elimination of both slash and competing vegetation. The removal of slash aids in fire protection. Consequently, part of the cost can logically be regarded as a fire protection expense.

Most of the recent experience has been at the Blacks Mountain Experimental Forest, Lassen County, in the ponderosa-Jeffrey pine type. The timber stand is predominantly ponderosa and Jeffrey pine, with white fir (*Abies concolor* [Gord. & Glend.] Lind.) entering on upper slopes and with a small amount of incense-cedar (*Libocedrus decurrens* Torr.) Topography at Blacks Mountain is generally not very rugged. Slopes from the flats to ridge tops average about 10 to 17 percent; occasional areas on the slopes run to about 60 percent. The geologic formation is volcanic in origin. The soil tends to be somewhat stony, though not to a prohibitive degree on most regeneration areas so far encountered.

Homogeneous stand units are harvested according to needs and conditions of the stand as prescribed by the unit area control method of management.[4] Overmature units without adequate advance growth are clearcut for regeneration. Only these units receive site preparation.

Regeneration areas have ranged in size from 0.2 acre to about 2 acres. Volume removed from such clearcut areas is about 20,000 board feet to the acre; this volume figure is given as a rough indication of the amount of logging slash encountered in the work.

Slash Disposal and Site Preparation Methods

Regeneration areas are selected and mapped when timber is marked for cutting. A cost estimate of slash disposal and seedbed preparation is then calculated for the intended acreage, using previous records of production and expenditures. This cost estimate usually is increased by an allowance for complete clearing of occasional small areas of advance reproduction which might be badly damaged during logging.

Equipment Used

Clearing has been done primarily with crawler tractors of 80 and 130 horsepower, equipped with cable-operated angledozer blades. In 1952, however, most work was done with a commercially manufactured "rock rake," or "brush rake," mounted on an 80-horsepower tractor. This blade had distinct advantages in piling slash, since it allowed most soil and duff to pass between the teeth. It appeared to be less effective than a solid-edge dozer blade in eliminating low vegetation on somewhat rocky areas. However, it was driven by an inept tractor operator, so the rake probably did not receive a fair test.

In 1949, at the Stanislaus Experimental Forest, Tuolumne County, some work was done with a 43-horsepower tractor equipped with a brush rake having widely spaced teeth. This equipment could pile all but the heaviest slash, but was unstable and did not effectively remove low vegetation.

Some users believe that an 80-horsepower tractor is more economical to use than one of 130 horsepower. The reasons are that (1) length of angledozer blades used on the two machines differ but little, and (2) maximum tractive effort is seldom required to move the material encountered. But probably even more important to cost than tractor size is skillful tractor operation.

Work Procedures

To keep costs low, it is essential that the quantity of material and the distance it is moved be held to the minimum necessary to do the job. Experience shows that some tractor operators have a tendency to "clean up" too thoroughly. They feel that their work is

[1]The Experiment Station is maintained at Berkeley, California, in cooperation with the University of California.

[2]Tackle, D. and D. F. Roy. Site preparation as related to ground cover density in natural regeneration of ponderosa pine. Calif. Forest and Range Expt. Sta. Tech. Paper 4. 13 pp. 1953.

[3]Roy, D. F. Effects of ground cover and class of planting stock on survival of transplants in the eastside pine type of California. Calif. Forest and Range Expt. Sta. Res. Note 87. 6 pp. 1953.

[4]Hallin, William E. Unit area control—its development and application. Calif. Forest and Range Expt. Sta. Misc. Paper 16. 10 pp. 1954.

TABLE 1.—COST AND TIME REQUIRED FOR SLASH DISPOSAL AND REGENERATION SITE PREPARATION[1]

Experimental forest and year	Cost[2]			Time per acre of regeneration area	
	Per acre of regeneration area	Per acre, gross area logged	Per M ft. b.m., all timber cut	Man-days	Tractor[3] meter time
	Dollars	*Dollars*	*Dollars*	*Number*	*Hours*
Blacks Mountain (Lassen National Forest)					
1951	7.91	0.33	0.04	0.2	0.6
1952	45.71	2.70	0.34	1.4	2.8
1953	50.58	2.27	0.44	0.9	3.4
1954	49.50	2.56	0.19	1.1	3.5
1955	36.91	1.20	0.24	0.9	2.1
Average, 1952-55	45.99	2.05	0.30	1.1	3.0
Stanislaus (Stanislaus National Forest)					
1948	70.90	25.23	0.64	1.9	4.8
1949	45.46	10.67	0.27	1.7	2.4

[1]Basic data shown in Table 2.
[2]Charges for hauling tractors, transporting men, and slash burning not included.
[3]Usually about 6 meter hours registered per 8 hour work day.

substandard if they don't clean all the surface to mineral soil. But narrow stringers of litter or logging slash, large windthrown trees, and even narrow strips of low vegetation can be left in an area without seriously interfering with normal spacing requirements for planted seedlings (in this case 6 feet by 6 feet). Likewise, when preparing seedbeds for natural seedfall, exposure of mineral soil on 100 percent of an area is not essential.

Sometimes the tractor work is oriented with the general direction of numerous skidtrails running through a regeneration area; this eliminated work on trails which were already cleared. Slash is sometimes piled on stump concentrations to eliminate lost time in maneuvering to clear the ground between the stumps. Slash is piled so as to occupy a minimum area and far enough from standing trees to prevent scorching or killing when the piles are burned. They are not ignited until after a snowfall.

Tractor operators are trained to examine their work continuously to ensure that they completely eliminate all vegetation within cleared strips. The work supervisor or swamper chops off at ground level any pieces of brush or damaged seedlings and saplings which were bent over but not completely removed by the tractor blade.

For the conditions at Blacks Mountain, the best site-preparation procedure on some areas requires two steps: First "once over lightly" to pile slash, then more thoroughly to expose mineral soil. In some areas the material from these latter passes is pushed to the edges of the clearings to keep large quantities of duff and soil out of slash piles that are to be burned. Where large amounts of slash occur on steep slopes, piles are made in the form of windrows on contours in order to reduce erosion. Also, on steep slopes the tractor blade is used to construct waterbreaks to reduce erosion in skidtrails.

During the 1955 season, Oscar Stark, logging foreman on the project, devised an efficient procedure for clearing some areas to mineral soil after slash is piled. After angling the tractor blade, the operator drives the tractor in a continuous spiral. Material scraped from the surface slides off the rear end of the blade, forming a narrow strip. In this method all tractor effort is expended in clearing, and effort in backing is eliminated. Size of area, steepness of slope, stump concentration, and necessary location of slash piles sometimes prevent or limit use of this method.

Owing to the small size of our operation, site preparation is usually left until the end of the logging season. On larger operations site preparation probably should follow logging more closely because slash is generally easier to handle when green, and the fire hazard would be reduced sooner. Regeneration areas are examined during the spring after burning to detect any hold-over fire that may be present.

Supervision

Slash disposal and site preparation are supervised closely by a forester or another well-trained man who clearly understands the purposes. Safety and efficiency require the presence of someone on the ground near the tractor operator. The supervisor is guided by logging maps showing regeneration areas and skidtrails. He locates work areas ahead of the tractor and directs the travel between areas to keep the tractor working continuously.

The supervisor determines and shows the boundaries to the equipment operator. Silvicultural considerations often govern his selection of the specific boundaries. For example, he may remove fringes or fingers of the less desirable white fir or incense-cedar reproduction that adjoin or extend into a pine regeneration area.

Some skillful, conscientious tractor operators soon become expert at picking good boundaries and proper locations for slash piles and in removing competing vegetation. Such men need less supervision than normal. In fact, at times they can be given a map and a swamper and left without immediate supervision. Then, quality of the work is checked at intervals of two or three days.

Costs

The cost of site preparation at Blacks Mountain varied during five years of record from $7.91 to $50.58 per acre treated (Tables 1 and 2). The 1955 cost—$36.91—is probably most representative of what can be expected with a reasonable amount of experience. On a volume basis, the relative investment for site preparation is low, from $.04 to $.44 per thousand board-feet net scale (Scribner), with $.24 being the representative figure in 1955.

The work in 1951 was planned just to "hit the high spots." This accounted for the low cost of $7.91 an acre. Later developments

TABLE 2.—BASIC DATA FOR COMPUTATION OF TABLE 1 (time-cost table)

Location and year	All labor		Equipment				Total cost	Regeneration area average	Gross acreage logged	Net scale logged
	Man-days	Cost[1]	Tractor horsepower	Metered time	Type or blade	Cost[2]				
	Number	*Dollars*	*Number*	*Hours*		*Dollars*	*Dollars*	*Acres*	*Acres*	*Bd.-ft.*
Blacks Mt.										
1951	3.75	67.50	80	12	angledozer	85.20	152.70	19.3	461.7	4,249,330
1952	22.37	402.66	80	45	brush rake	319.50	722.16	15.8	267.5	2,124,850
1953	21.00	378.00	130	76	angledozer	744.80	1,122.80	22.2	494.6	2,527,280
1954	12.25	220.50	80	16	angledozer	113.60				
			130	24	angledozer	235.20				
				40		348.80	569.30	11.5	222.0	3,000,100
1955	13.75	247.50	130	32	angledozer	313.60	561.10	15.2	466.3	2,292,030
Stanislaus										
1948	60.00	1,080.00	80	117	angledozer	830.70				
			130	38	angledozer	372.40				
						1,203.10	2,283.10	32.2	90.5	3,559,140
1949	43.5	783.00	43	15	brush rake	60.75				
			80	47	angledozer	333.70				
				62		394.45	1,177.45	25.9	110.4	4,413,460

[1]All labor computed at $2.25 per hour or $18.00 per 8-hour day.
[2]Tractor cost computed at U. S. Forest Service, Region 5, 1955 hourly rates: 43 H.P.—$4.05; 80 H.P.—$7.10; 130 H.P.—$9.80.

showed that insufficient low vegetation had been removed; seriously high losses of planted seedlings occurred on some of the areas. Consequently, the averages shown in Table 1 include only 1952-55 data.

Costs for slash disposal and seedbed preparation with a commercially manufactured brush rake in 1952 were favorable even though the operator was very inept. The cost that year—$45.71 an acre cleared—is close to the average. We believe that brush rakes should be more thoroughly tested in the hands of skilled operators.

Some comparative cost data are given for work during two years on the Stanislaus Experimental Forest, about 30 miles east of Sonora. Timber stands there are typical of the high site quality sugar pine-fir type of the western slopes of the Sierra Nevada. This work was reported previously[5] but costs have here been converted to current rates. The high cost at the Stanislaus Experimental Forest in 1948 was undoubtedly due to lack of experience. Cost of the Stanislaus work in 1949 — $45.46 — is about the same as the average at Blacks Mountain. At the Stanislaus Experimental Forest about 88,000 board-feet to the acre was cut on regeneration areas. The comparative figure for Blacks Mountain is 20,000 board-feet to the acre, as previously mentioned. Volume of slash, then, may not be a predominant factor in the cost of seedbed preparation.

[5]Gordon, Donald T. and Richard D. Cosens. Slash disposal and site preparation in converting old-growth sugar pine-fir forests to regulated stands. Calif. Forest and Range Expt. Sta. Res. Note 81. 7 pp. 1952.

Conclusion

Site preparation is an essential treatment of clear-cut regeneration areas in the application of unit area control to the ponderosa-Jeffrey pine type. However, the benefits will be lost unless seedlings are established before the areas are invaded by competing vegetation. As site preparation is the first investment in establishing a new crop, additional reductions in cost are desirable. Consequently, further investigations to develop new methods and equipment should be carried on.

John Harold Foster (1880-1956)

The death of John H. Foster, former state forester of New Hampshire, occurred on September 6, 1956 at Concord, N. H. He had been in poor health for a long time. Born in Waltham, Mass., he was graduated from Norwich University and received his M.F. at Yale in 1907. In 1940, Dartmouth College conferred on him an honorary M.A.

Serving first in the U. S. Forest Service from 1907 to 1911, he then spent 4 years as professor of forestry at the University of New Hampshire. In 1915, he became the first state forester of Texas. He was appointed state forester of New Hampshire in 1920, which post he held until his retirement in 1951. During this period he was responsible for many of the advances in forest fire protection, acquisition, and management of state forests and their development for public recreation. The expanded forestry activities of the depression years, the 1938 hurricane, and the great fires of 1942 and 1947 were some of the many crises he met ably. Finally he was active in timber tax reform since 1907 culminating in the 1949 law in New Hampshire. Long a member of the Society, he served in many capacities, especially in the New England Section.

At the dinner tendered him on his retirement Gov. Sherman Adams referred to him as "Honest John." Certainly that was one of his outstanding qualities; but he was above all a friendly and kindly man, and as such his many friends and associates remember him with affection.

Notes

Age of Oak "Seedlings"

The obvious way to find out how silvicultural treatments affect tree regeneration is to count the seedlings that have come up since the treatment in question. However, a recent study has revealed that many of the oak "seedlings" that develop after a partial cutting are in reality sprouts from older root systems. Some of the seedlings that appeared to be from 1 to 5 years old had root systems nearly 40 years old. Liming and Johnston (*1*) found similar conditions in an oak-hickory stand in Missouri in 1938.

The present study was made in an oak-hickory stand on the Vinton Furnace Experimental Forest in southeastern Ohio. Casual observation had shown that the true age of an oak seedling cannot always be determined by counting the annual rings on the stem. To obtain more information 100 oaks less than 4.5 feet tall that appeared to be of seedling origin were selected according to a grid system and dug on a 5-acre plot in a stand that had been cut selectively 2 years previously.

Each "seedling" was later severed 1 inch above and 1 inch below the root collar. The diameters at these points were measured to the nearest 1/16 inch and age was determined by counting the annual rings with the aid of magnification when needed. Because the annual rings were difficult to distinguish in some specimens, the ages determined in this study should be considered as minimum.

Specimens 2, 3, and 4 in Figure 1 are examples of trees whose roots are older than their tops. In compliance with the definition in *Forestry Terminology* (*4*) the authors refer to this type of regeneration as "seedling sprouts." Liming and Johnston (*1*) call such trees "stool sprouts." Toumey and Korstian (*5*) point out that "stool shoots" develop from adventitious buds. Since the seedling sprouts shown in figure 1 apparently developed from true buds, they may properly be called seedling shoots or sprouts. On the majority of the specimens studied, there were several to many well developed buds clustered around the stem at the root collar.

Nearly three quarters of the trees examined were seedling sprouts, the roots being as much as 31 years older than the stems. The root of the oldest oak found was 37 years old and 14/16 of an inch in diameter; the top of this same tree was 6 years old and 3/16 of an inch in diameter. The two largest roots of the oaks studied had diameters of $1\frac{3}{16}$ inches and were 30 and 32 years old. The tops of these two oaks were 20 and 7 years old and the diameters measured 14/16 and 3/16 inches respectively.

The study also showed that only 12 of the 100 oaks were true seedlings that became established since the 1953 cutting. An additional 11 had stem ages that would lead a casual observer to believe they originated since the cutting, but these latter oaks had roots that

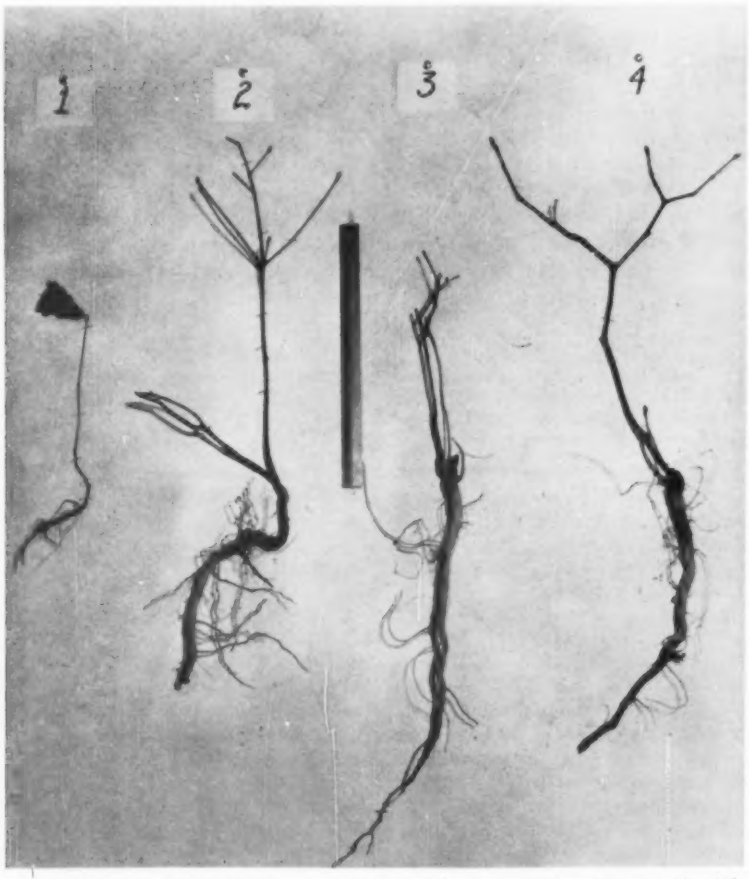

FIG. 1.—Four examples of oak reproduction: (*1*) true seedling 1 year old; (*2*) seedling-sprout, stem age 5 years, root age 17 years; (*3*) seedling-sprout, stem age 2 years, root age 12 years; and (*4*) seedling sprout, stem age 5 years, root age 18 years.

ranged in age from 3 to 27 years.

Of the 100 oaks studied only 26 had stems and roots of the same age (14 originated before the 1953 cut). There was no apparent relationship between stem age and root age for the other 74 oaks studied. Hence there is no reason to suspect that dieback of the seedling stems is most prevalent during the first few years after establishment. Although Liming and Johnston (*1*) related the age of the stems of stool sprouts in Missouri to fire occurrence, no evidence was found in the current study to suggest that dieback of seedlings was associated with fire.

This preliminary study has shown that the roots of oak reproduction may be as much as 31 years older than the stems. If this is typical for reproduction in oak-hickory forests in southeastern Ohio, the age of the stem, as indicated by size, number of terminal bud scars ,and the number of annual rings, cannot be used as a criterion to indicate the time of their establishment. It is, of course, important to determine if these seedling sprouts of different ages will develop into desirable trees, or if practices to encourage the establishment of a new stand of seedlings are necessary at the time of cutting the overstory stand.

Reynolds (*2*), found that regeneration of hardwoods in pine stands of Arkansas, following removal of the hardwood seed trees, was due to sprouting from old root stocks. He found that several hundred hardwood shoots had rootstocks much larger and older than the tops. That these old root systems persist is evident by the fact that even after 2 successive years of poisoning all green stems with ammate, there remained a stocking of 250 stems per acre 3 years later.

Roth and Sleet (*3*), as a result of a study they made in the Allegheny, Appalachian, and Central States regions, recommend that seedling sprouts as well as seedlings should be favored as crop trees. Liming and Johnston (*1*) state that the stool sprouts they studied in Missouri increased in height at about twice the rate of seedlings. However, a different opinion is expressed by Toumey and Korstian (*5*) who point out that trees originating from seed are much longer lived than those derived from stool or root shoots. It is believed that further study of seedling sprouts is needed to evaluate the role of this class of reproduction in the oak-hickory forests of southeastern Ohio.

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Red Pine Indigenous to Illinois?

Five specimens of red pine (*Pinus resinosa* Aia.) have been located on the banks of the Fox River at Sheridan, Illinois, twenty miles upstream from the confluence of the Fox and Illinois Rivers at Ottawa. One of the trees is dead and two others are nearly so. The flattened crown of one living tree indicates considerable age and a poor site. All trees are situated on a thin mantle of soil covering a sandstone ledge twenty feet in height that borders the river. Associated trees are red oak (*Quercus rubra*), white oak (*Q. alba*), juneberry (*Amelanchier* spp.), blue beech (*Carpinus caroliniana*), and hackberry (*Celtis occidentalis*). The exposure is east.

FIG. 1—Red pine, estimated at 160 years of age, found growing near Sheridan, Illinois.

A seven inch increment boring taken from one live tree contained 140 rings. The length of the increment borer prohibited a longer boring, but permission to fell the dead tree is being sought for an exact age determination. As this tree was 17.5 inches d.b.h., it seems safe to assume that its age approximates 160 years.

All trees are close to the edge of the ledge and it is inconceivable that anyone would plant trees in such a location. It also seems highly improbable that anyone was planting pine trees prior to 1800 along the Fox in Illinois.

E. L. Krammerer, curator of collections, Morton Arboretum, Lisle, Illinois, could find no record of *P. resinosa* being reported from Illinois previously.

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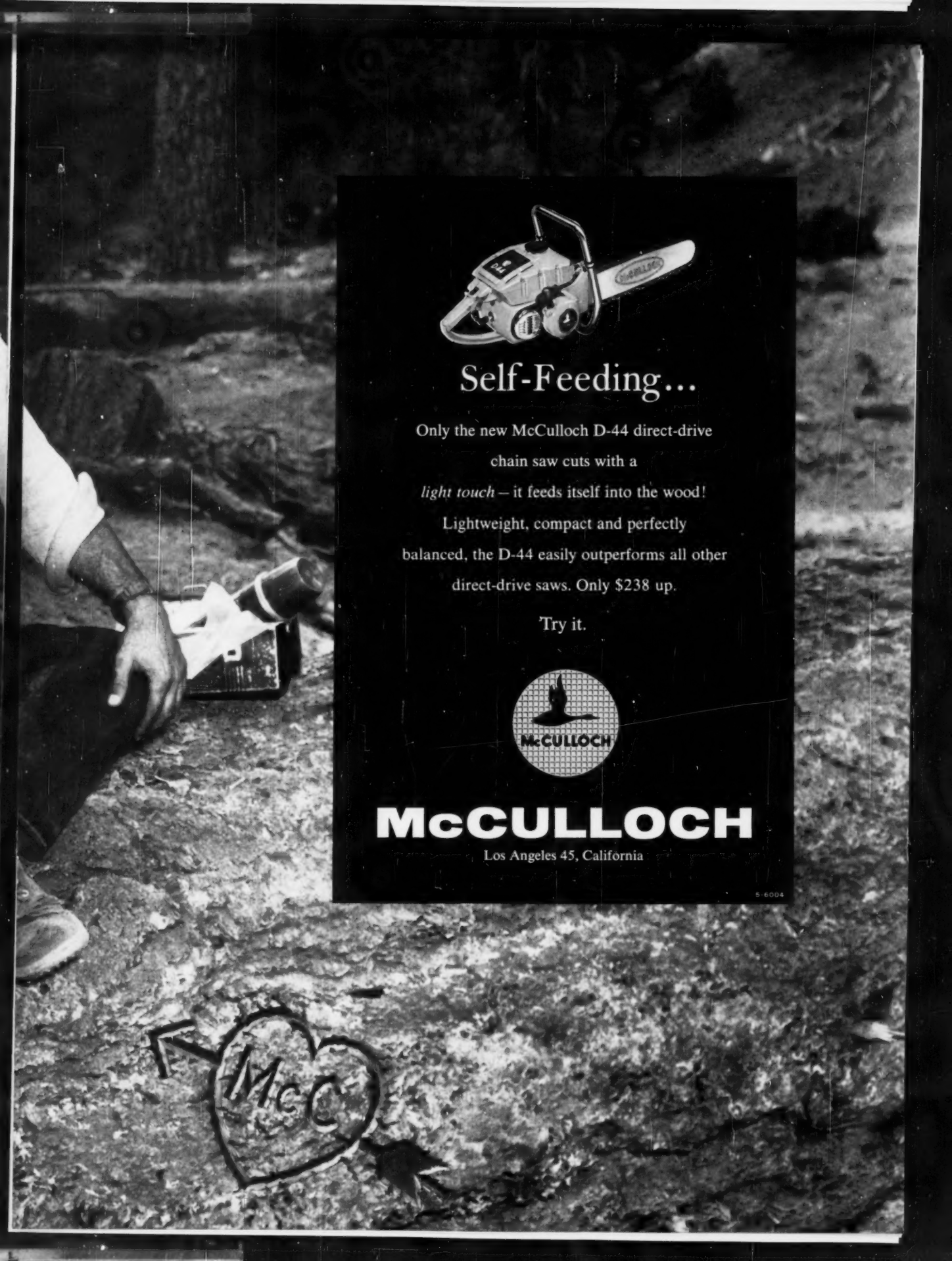

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Are Ponderosa Pine Cone Crops Predictable?

If the relative quantity of ponderosa pine flowers and the probable yield of cones could be predicted one year and two and one-quarter years in advance, respectively, there would be a very decided advantage for better planning in the following phases of forestry: (1) Laying out work schedules in the pollination of ovulate strobili in the field of forest genetics. (2) Timely seedbed preparation and harvesting of timber to insure adequate natural regeneration of the forest. (3) An adequate and more economical collection of cones during favorable seed years.

A study of the relationship between twenty-three years of California temperature records and the size of the subsequent cone crops appears to indicate that cone crops of ponderosa pine will be predictable. The results of this study are offered as indicative rather than conclusive; further research most certainly will refine and narrow them as to the effective periods of critical temperature with regard to cone crop production.

In the following analysis, which establishes a cone crop prediction hypothesis, portions of three years in the development of the future cone are recognized as important. These are: (1) The critical temperature year. (2) The flower or conelet year. (3) The mature cone year.

The critical temperature year is the year in which the differentiation of cells is accomplished in the newly formed terminal buds. Apparently, this differentiation occurs in April and May, approximately twenty-seven months prior to cone maturity. It is thought that the critical temperatures during this year must be above normal to cause the cell differentiation which will produce flowers the following year (Tables 1 and 2).

During the flower or conelet year, conelets may be frozen and killed by minimum temperatures of 25 degrees F. or lower during June.[1] During the subsequent or mature cone year the conelet does not appear to be harmed by these low temperatures.

Table 1 indicates that good cone crops may be expected whenever the total average monthly temperatures for April and May during the critical temperature year are above average. Conversely, whenever the total temperature is below normal a poor subsequent cone crop may be expected twenty-seven months later. In using this critical temperatures hypothesis it is evident that the hypothesis is supported twenty out of twenty-three times.

Possibly the failure of the 1936 favorable critical temperature year to mature a good crop of cones in 1938 was due to very low minimum temperatures in June 1937—the flower or conelet year. The failure of the 1940 favorable critical temperature year to mature a good 1942 crop of cones may be explained by an exhaustion of nutrients caused by the two previous excellent cone crop years of 1940 and 1941. It will be noted that the 1938 critical temperature year was unfavorable, but the subsequent cone crop yield in 1940 was excellent. Possibly this marks a lack of precision in the hypothesis which, as is evident, is generalized in the extreme.

It may be well to point out here that the generalized cone crop yield data are only as accurate as the observers' judgments, and it is possible that the data are not as uniform as they could be. Also, it seems quite unreasonable that the average monthly temperature in April and May for the entire State of California should have any bearing on the cone crop yield twenty-seven months later. However, data in Table 1 do corroborate the temperature hypothesis.

The hypothesis actually was developed from the coincidence, shown in Table 2, favorable critical temperature years and subsequent high

TABLE 1.—CALIFORNIA TEMPERATURE DATA FOR APRIL AND MAY 1926 TO 1948, AND CONE CROP YIELDS, 1928 TO 1950, SUPPORTING THE CRITICAL TEMPERATURE YEAR HYPOTHESIS

Critical temperature year	Average temperature April	Average temperature May	Total average temperature April & May	Cone crop yield-year	Percent cone crop yield[2]	Significant
	Degrees F[1]		*Degrees F*		*Percent*	
1926	61.8	63.7	125.5	1928	75	Yes
1927	54.7	60.6	115.3	1929	10	Yes
1928	55.6	64.6	120.2	1930	75	Yes
1929	50.8	61.6	112.4	1931	10	Yes
1930	56.7	56.7	113.4	1932	25	Yes
1931	58.6	66.3	124.9	1933	75	Yes
1932	53.5	60.1	113.6	1934	10	Yes
1933	54.0	55.2	109.2	1935	10	Yes
1934	60.3	63.8	124.1	1936	100	Yes
1935	54.4	60.1	114.5	1937	10	Yes
1936	56.7	62.8	119.5	1938	25	No[3]
1937	53.5	62.5	116.0	1939	25	Yes
1938	54.6	61.1	115.7	1940	100	No
1939	58.9	61.7	120.6	1941	75	Yes
1940	56.5	64.0	120.5	1942	25	No[4]
1941	53.1	62.8	115.9	1943	10	Yes
1942	54.0	58.5	112.5	1944	25	Yes
1943	57.0	62.8	119.8	1945	75	Yes
1944	52.5	61.0	113.5	1946	50	Yes
1945	55.4	59.5	114.9	1947	10	Yes
1946	57.2	61.0	118.2	1948	75	Yes
1947	57.9	65.0	122.9	1949	100	Yes
1948	53.1	58.6	111.7	1950	10	Yes
Average	55.7	61.5	117.2			

[1]U. S. Department of Commerce, Weather Bureau publications, "Climatological Data—California" for April and May, 1926 to 1948.

[2]U. S. Forest Service 1950 by Corson, C. W. (1 sheet).

[3]Severe freeze minimums at high elevations on June 1, 2, and 17, 1937.

[4]No severe freeze minimums in June 1941, but previous two years produced excellent cone crops which may have exhausted essential plant nutrients.

[1]Fowells, H. A. 1948. The temperature profile in a forest. Jour. Forestry 46:897-899.

cone crop yields twenty-seven months later. In addition, the following examples of partial cone crops in Table 2 seem to indicate that future research on the subject will narrow the critical temperature period from two months to a lesser period. The critical temperature years of 1930, 1937, and 1944, showing large surplus departures for either April or May but for only one of these months, produced 25 to 50 percent cone crop yields in 1932, 1939, and 1946, respectively. However, this was not true for the 1941 critical temperature year when the reported cone crop yield for 1943 was 10 percent. In future refinement of the hypothesis elevational range will be an important consideration.

TABLE 2.—SHOWING CONE CROP YIELD DATA AND PRIOR AVERAGE MONTHLY TEMPERATURE DEPARTURES FOR THE YEARS 1930 TO 1950, IN THE APPROXIMATE LATITUDE OF 39 DEGREES NORTH AND LONGITUDE 123 DEGREES WEST FOR MEDIUM ELEVATIONS

Year	Cone crop yield	Jan	Feb	Mar	Apr	May	Junue	July	Aug	Sept	Oct	Nov	Dec	Class seed year
	Percent													
1930	75	−2[1]	5	2	4	−4	2	1	0	−2	1	1	−1	Excellent
1931[2]	10	2	4	3	5	6	1	6	2	−0	1	−3	−1	Barren
1932	25	−2	−1	4	0	0	2	1	0	5	2	5	−4	Poor
1933	75	−3	−5	1	1	−4	0	6	3	0	7	3	3	Excellent
1934[2]	10	5	4	9	7	5	2	2	3	2	3	2	2	Barren
1935	10	2	0	−3	1	0	5	0	3	5	−0	−3	1	Barren
1936	100	4	2	2	4	4	3	4	3	3	3	1	−0	Excellent
1937	10	−12	−2	1	−1	4	0	2	1	3	3	3	4	Barren
1938[2]	25	2	1	−3	1	2	3	1	1	3	−0	−1	2	Poor
1939[2]	25	2	−3	2	6	3	1	2	2	3	2	3	6	Poor
1940	100	3	3	4	3	6	6	0	2	−1	2	−1	4	Excellent
1941	75	5	3	3	−1	3	−1	1	−1	−1	−1	3	1	Excellent
1942	25	−1	−1	−1	−1	−1	1	3	2	1	2	1	1	Poor
1943[2]	10	2	2	2	2	3	−4	1	−2	4	1	2	1	Barren
1944	25	1	−2	?	−0	2	−3	−1	0	3	4	−2	−2	Poor
1945	75	0	2	2	−3	−0	−0	−1	3	−0	3	0	2	Excellent
1946[2]	50	−0	−2	0	4	2	−0	2	1	2	−2	−2	2	Good
1947[2]	10	−3	3	4	4	6	0	−2	−0	4	1	−3	−1	Barren
1948	75	4	−2	−3	−2	−2	0	−0	−1	2	2[3]	..	..	Excellent
1949	100	..	..	..	..	..	..	..	..	..	..	..	..	Excellent
1950	0	..	..	..	..	..	..	..	..	..	..	..	..	Very barren

[1]U. S. Weather Bureau, "Monthly Weather Review," isothermic charts showing departures.

[2]Favorable critical temperature year, followed by favorable cone crop response twenty-seven months later. Thus, the twelve degrees total surplus departure in 1934 predicated the 100 percent cone crop in 1936.

[3]Departures from October 1948 are weighted differently than previous years and are not comparable.

Summary

By means of relating cone crop yields with average monthly temperature data, the following temperature hypothesis was developed: whenever the total average monthly temperatures for April and May are considerably above normal, ponderosa pine trees will flower in abundance the following spring, with the subsequent excellent cone crop potential in the fall of the following year. Conversely, whenever the temperatures are below normal few flowers will appear the following year.

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Shortleaf-Loblolly Hybrid Pines Free of Fusiform Rust After 5 Years' Exposure

Since fusiform rust (*Cronartium fusiforme* (Arth.) Hedge. and Hunt) is both a serious and widespread disease of loblolly pine (*Pinus taeda* L.), incorporation of resistance to the rust is obviously a most desirable goal of genetics research. Among the major species of southern pines, only shortleaf (*P. echinata* Mill.) is resistant. Hybridization of shortleaf and loblolly and the testing of the progeny for rust-resistance appears to be a logical step.

In 1950, the Gaylord Container Corporation, Bogalusa, Louisiana, sowed a lot of shortleaf-loblolly hybrid seed from the Western Institute of Forest Genetics, Placerville, California. The female parent, shortleaf, was of Oklahoma origin, and the male parent, loblolly, was from Louisiana. The seedlings were grown in the Gaylord nursery, and outplanted in February 1951 in Washington Parish, Louisiana, in the midst of a 1948 plantation of slash pine (*P. elliottii elliottii* [Engelm.] Little and Dorman).

In 1955 and again in February 1956, the 31 surviving hybrids were carefully examined for fusiform rust cankers. None were found. At the latter date, 100 planted seedlings immediately adjacent to the hybrids were selected without bias and examined. Of these, 97 were slash pine and 3 were loblolly that had been included in the plantation by accident. Sixty-five of the slash and all 3 of the loblolly had fusiform cankers. As both slash and loblolly are very susceptible and there has been no evidence of physiologic races of the rust, we assume from the heavy infection of the slash that if more native loblolly had been present they also would have been heavily infected.

Though the number of trees involved here is small, the 5-year results do indicate rust resistance in the shortleaf-loblolly hybrid. This lead is being followed up in the rust-resistance breeding program at the Southern Institute of Forest Genetics.

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Points of View

Genetics *and* Exotics

Geneticists are not likely to quarrel with Mr. Hardee's plea for increased experimental work with exotics.[1] They may, however, feel that he has, in the limited space he used, oversimplified the relation between tree improvement and species introduction in such a way as to be misleading.

Some of the first tree improvement programs in this country were deeply involved in the use or development of arboreta and botanic gardens in which exotics had been assembled. Examples are the poplar hybridization work of Stout and Schreiner and the pine hybridization program of the Institute of Forest Genetics. This trend continues, along with the tendency of some workers to devote more attention to selection within native species, and it is probably fair to say that no soundly based tree improvement program in this country today completely overlooks the use of exotics. After all, most hybrids are, to some extent, exotic to the area in which they are used.

The success of Monterey pine in the temperate regions of the Southern hemisphere is certainly impressive, and has beguiled more than one visitor to these man-made forests. This success is not only biological, but also economic; there was an unsatisfied demand for a tree like Monterey pine just as surely as there was a biological niche into which it could be fitted. Certainly, one approach is to "try all the species in the world that might thrive in a particular area." This has a strong appeal to those of us who like trees for their own sake. Forestry, however, is strongly tainted with economics, and so another approach might be to ask what types of trees the actual or potential industries in a particular region can use most effectively. This might lead to a more discriminating program of tree introduction research. Some of our tree immigrants have been outstanding biological successes, e.g. *Ginkgo*, *Ailanthus*, Norway and sycamore maples, and the eucalypts, but none of these has yet made an appreciable contribution to the forest industries, even though we are glad to have them for other uses.

The use of exotics in forestry has been widely studied for more than a century, with the result that the climatological bases for successes and failures are moderately well understood. Although it is possible that American forestry may benefit in significant ways from tree introductions, it is probable that these benefits will come in the form of genes introduced by tree breeders into native species rather than by introductions of exotic species as such. The North American continent, including Mexico, with its great riches of tree species, seems likely to maintain a favorable export balance of tree species to other temperate regions of the world. To mention but one fact which supports this belief, there is the north-south orientation of our mountain chains which has prevented the extinction of tree species during periods of glaciation — a process which is thought to have impoverished the floras of great parts of Europe and Asia.

Those who have devoted much thought to the problems of American tree improvement are likely to take strong issue with the position that hybridization and selection should wait on the completion of tests of large numbers of exotics. Thorough testing of exotics requires at least a rotation. Native species are already tested, and yet even these, in unusual years, give ample and distressing evidence that the testing has not been severe enough. Moreover, we deal with a highly dynamic process. The white pines of North America are unequaled by any similar or related species of the temperate regions of the world in growth, form, wood qualities, and adaptation to the climates of some of our major forest regions. Yet within a single rotation, their continued existence has been seriously threatened by an introduced disease, and their commercial value in one major forest region has been largely undermined by a native, but newly important, insect. Examples of this sort could be multiplied at great length. We are not likely to be granted the time to complete the testing of all the candidates for a given environment before taking more intensive plant breeding measures. Since we work with plants which require many years to mature, it seems sound strategy to carry on concurrently those operations which the breeder of annual plants conducts in orderly sequence. It appears, in other words, that tree breeders prefer spending extra effort and space in order to save time. Candor forces me to add that tree breeders prefer seeing the results of their labors to posthumous recognition.

Surely, foresters should be happy, though not complacent, with Mr. Hardee's estimate that "we must be some two to three hundred years behind agriculture." Pomology, at least, has a long start on forestry, for Adam's venture appears to have antedated Noah's logging operations by at least a millenium, and we may be permitted to speculate that then, as now, the forester was called in only after the logger was in trouble. Moreover, it is not recorded that any forester was on hand to suggest the use of vegetation as an alternative to Noah's or the tower builders' engineering approaches to flood control.

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[1]Hardee, J. H. Genetics or Exotics? Jour. Forestry 54:473. 1956.

Reviews

Forestry in the South

By M. D. Mobley and R. N. Hoskins. 440 pp. Illus. Turner E. Smith & Co., Atlanta, Ga. 1956. $3.95.

Basic to the problem of developing a consciousness of the masses toward natural resource conservation is the availability of well-prepared teaching aids for teachers and students at the elementary and secondary grade levels. This problem is being attacked today with great vigor by the recently organized Conservation Education Association and also by such leaders in conservation education as Dr. Claire L. Taylor, superintendent of the Michigan Department of Public Instruction. Educators are sensitive to the fact that if conservation is to keep pace with educational trends, it must begin at the elementary grades and then be carried through the high school curriculum. Attractive and suitable subject material is a *must* for the success of such an educational undertaking.

Accordingly, the forestry profession should welcome with satisfaction, and as a challenge, the teamwork of Mobley and Hoskins in their *Forestry in the South*. Designed for teachers at the elementary grade level and for both teachers and students in high schools, it should be especially valuable in forestry education to students enrolled in vocational agriculture.

The authors are well-qualified to handle their subject. Mobley, before becoming executive secretary of the American Vocational Association, was with the Vocational Agricultural Department of Georgia. Under his guidance, Georgia became a leader in forestry education as a part of the public school offering.

With a B.S. degree in forestry from Iowa State College in 1939, Hoskins served as extension forester for the Florida Forest Service, and since 1945 he has "kicked up the dust" as industrial forester for the Seaboard Air Line Railroad Company. Recently, he was promoted to general forestry agent, a new position created especially to give recognition to his contribution to the forestry program of the Seaboard.

Forestry in the South is a well-balanced elementary text. The first chapter explains our forest heritage. Chapters 2 and 5 deal with the relationship of forests to agriculture, soil, wildlife, water, and recreation. The chapter on recreation, for example, explains our national park system and shows how it is influencing the recreational development in the South today.

Industrial forestry, particularly as it applies to the economic development of the region, as expressed through lumber, pulp and paper, and naval stores, is the topic of Chapters 6 to 10. (Effectively written, from an educational standpoint, is the chapter dealing with naval stores, for here, as in other chapters, the story-telling, conversational form is used.)

In Chapters 11 to 20, the writers cover, in simple and understandable terms, basic technical forestry —silvics, tree identification, protection, tree measurements, management, marketing, and restocking the forest both naturally and artificially. Special attention is given to tree planting, and the Appendix lists the forest tree nurseries in the South and gives their locations.

The two final chapters consider forestry education and services and conclude by offering the high school student facts that would enable him to decide upon entering the forestry profession.

Consistent with standard text book form, at the end of each chapter there are a set of suggestions for study and a list of selected references. These can be valuable aids to those teachers and pupils who are stimulated to act beyond the "call of duty" in gaining a broader knowledge of Southern forestry.

Some members of the forestry profession will feel that the book is too simple or expresses nothing new. With these arguments I take sharp issue. Remember, this is a textbook designed primarily for teachers and students occupying the elementary and secondary educational levels. According to basic standards of good writing and arrangement of subject matter, it is capable of doing the educational job for which it is intended.

Foresters within the region can aid the progress of forestry education through encouraging the adoption of *Forestry in the South* in the public schools. And foresters in other sections can improve the national educational program by preparing similar subject material adapted to their particular conditions.

MARLIN H. BRUNER
Clemson College

Man's Role in Changing the Face of the Earth

Edited by William L. Thomas, Jr. 1192 pp. Illus. University of Chicago Press, Chicago, Ill. 1956. $12.50.

In June 1955 there was held at Princeton University an international symposium, attended by 70 scientists, on "Man's Role in Changing the Face of the Earth." It was sponsored by the Wenner-Gren Foundation, established in 1941 to aid in the advancement of anthropology as the study of man. The National Science Foundation assisted with a grant enabling publication of this volume.

No review could adequately ap-

praise this book in less than a couple of thousand words. By my estimate, it contains more than 600,000 words. Its actual weight is 5½ pounds. The best one can hope to do in limited space is to tell what it is about.

In brief, it is an attempt to evaluate what has happened and what is happening to the earth as a result of man's occupancy. The story is presented in 55 separate papers.

Although no professional forester attended the conference, several papers were presented by scientists working in research and management of soil, water, and the renewable natural resources. Among these participants were Edward H. Graham of the Soil Conservation Service, Luna B. Leopold of the U. S. Geological Survey, Samuel H. Ordway of the Conservation Foundation, Fairfield Osborn of the New York Zoological Society, and Paul B. Sears of Yale University.

The interested influences involved in the exploration of the broad subject are "(1) the earth's resources; (2) the numerical pressure of population upon, and sustained by, the resources; and (3) man's differing cultures or ways of life." At the risk of oversimplification of an extremely complex subject, to this reviewer the conclusion that can be drawn from the symposium is this: to man's evolutionary control and use of the earth's resources there is only one threat. That threat is man himself.

HENRY CLEPPER

Wilderness Camping and How to Enjoy It

By Keith Wilton Barnes. 51 pp. Vantage Press, New York City. 1956. $2.

Wilderness recreation today challenges timber-production forestry frequently enough that any book touting wilderness living merits reviewing. This book, however, belies its title. It never defines wilderness. The reader cannot detect whether camping described is in actual wilderness or amid summer home colonies.

In the six chapters constituting the text—(1) Bears and Beavers, (2) Birds and Birdhouses, (3) Wood Carving, (4) Repairing and Handling Boats, (5) Animal Tracks and Fishing, and (6) Camping—nature lore, handicrafts, and embellishments such as the scientific names of birds and fishes relegate camping to superficial discussions.

The author's outdoors is his well watered, native, Ontario. High altitude and desert camping are unmentioned. His trees are balsams, birches, cedars, pines, and spruces. His canoes are canvas-covered wood. He extols Indian birchbarks, but ignores aluminum canoes which become dominant in the highly mechanized United States. His bears include Alaskan brown, grizzly, and polar bears, but his observations are not unquestionably his own.

This book reveals no memorable statements expressing the essence of wilderness living in terse pungencies. Boyish effervescences are numerous: "Campsite here we come ... the scented pines will reach for your nostrils. A babbling brook . . . trying to say something to you . . . Boy, what a delicious drink!" The most arresting statement is: "Only a rank greenhorn ever turns a griddle cake twice." Skilled sourdoughs may reply: "So what?"

Ambiguities are common: "A canoe is not an instrument to fool around with; it is a craft for enjoyment only." Portaging a canoe ". . . will be easier on your shoulders if you have a pack on your back to assist you." "Our forests provide moisture which helps to prevent soil erosion." For sleeping, Mr. Barnes recommends beds of "nice thick evergreen branches." Nor does his description warn against thick wood among the twigs.

Traditionally arduous tasks like making buckskin and keeping a good ax in forests where chopping is important are lightly treated: "When you have killed a deer you can use the hide for your clothing. After you have removed the skin, take the brains and rub the pelt with them . . . till it becomes pliable. Then you can make your own clothing and boots. The bones can be put to use by making the shoulder blade into an axe. Sharpen the edge on a rock and take the main leg bone and attach this to it to form the handle." Grub lists and recipes are tossed in with the same gay assurance. Some possess utility, but are too scattered in coverage to make the book a valuable reference.

This book cannot win stature among classics on wilderness living. An outdoorsman's recorded experiences always are interesting, and the author's blithe sincerity and enjoyment weaken a reviewer's temptation to term them drivel, but this volume is valuable chiefly as light reading.

J. V. K. WAGAR
Colorado A & M College

Pulp and Paper Prospects in Latin America

By Food and Agriculture Organization of the United Nations. 465 pp. Columbia University Press, New York, N. Y. 1956. $4.50.

This publication is a report of a meeting of experts held in Buenos Aires, October 19-November 2, 1954, under the sponsorship of several agencies of the United Nations. The report is divided into two parts. The first part gives an account of the meeting itself—composition, attendance, organization, proceedings and conclusions. The second part reproduces, in full or in condensed versions, the papers submitted to the meeting. Appendix I gives a list of participants in the meeting and of those who contributed papers but were unable to attend it. Appendix II reproduces the addresses delivered at the opening session.

The Latin American meeting on the pulp and paper industry was attended by 154 experts from all

South American republics, and Costa Rica, Cuba, Mexico, and Surinam. Thirty-two specialists from Australia, Canada, Finland, France, Italy, Norway, Sweden, the United Kingdom, the United States of America, and West Germany were also present. Argentina, as host government, sent an official delegation.

The meeting adopted the following agenda for its working sessions: Pulp and paper consumption, production, and trade in Latin America; economic aspects of pulp and paper manufacture from Latin American tropical and sub-tropical hardwoods; aspects of pulp and paper manufacture based on other Latin American forest resources; economics of pulp and paper manufacture from sugar-cane bagasse; presentation of papers on selected technical matters; review of development prospects for pulp and paper industries in selected Latin American countries; financing of Latin American pulp and paper development; and newsprint

For each item discussion leaders were appointed and drafting committees formed. In addition, two working groups were formed to deal with special subjects which the Meeting considered to be of particular interest. One of these dealt with eucalypts and the other with problems of technical assistance, research, and training.

In the final plenary sessions the texts of the committee and working group reports were discussed and approved. The sectional reports and conclusions, as well as the working papers submitted, are presented. In all, 73 papers were received and circulated, 10 compiled by the Secretariat, 63 contributed by the experts.

About one-third of the book is occupied by the working papers which deal with the economic aspects of pulp and paper manufacture from Latin American tropical and sub-tropical hardwoods. There is much of interest to the forest economist and wood utilist. Another section of interest to the forester is that on aspects of pulp and paper manufacture based on other Latin American forest resources. Although endemic conifer and temperate broadleaved forests are briefly considered, chief emphasis in this division of the report is on plantations.

In the opinion of the reviewer the editors have done a commendable job in condensing papers when necessary and in presenting a very readable resumé of the meeting. The task of coping with the expanding pulp and paper needs of the peoples of the world is a big one which requires the co-operation of many experts.

IRVING H. ISENBERG
The Institute of Paper Chemistry

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Forest History Sources of the United States and Canada

Compiled by Clodaugh M. Neiderheiser. 140 pp. Forest History Foundation, Inc., St. Paul, Minn. 1956. $3.

Only those exploring the pioneer paths of our forest industries and forestry development will find *Forest History Sources* a helpful guide. For them, it is indispensable. Here are catalogued by states and institutions almost a thousand references to original manuscript material comprising a marvelous miscellany from our past. Inventoried is a tremendous range of subject matter including such diverse items as ledger books of lumber yards, surveyor and estimator dairies, and various papers, letters, maps, and other documents from such concerns as log driving companies, logging outfits, carriage makers, ironmongers, and builders of railroads and ships. Material is not lacking from the conservation or professional forestry fields. Many references are to documents of the Colonial period. One from Quebec goes back to 1660.

The documents cited have been reported by cooperating libraries and other comparable depositories. Consequently, there is a wide disparity in the volume of material represented by the separate indices. One reference is to a manuscript of 2 pages; another is to the 264 cubic feet and 59 volumes comprising the 1882-1946 records of the Office of the Chief Forester. Incidentally, this last reference is only one in a series of subject matter from the Forest Service and represents perhaps only a fifth of all that from this one public agency preserved in the National Archives.

There is some lack of evenness in the presentation which will probably be corrected in future editions. This may be attributable to the manner of reporting by many agencies. Some citations are to "papers" without any indication as to quantity or period. Others are to number of "boxes," cubic feet, or "volumes." References are made to the papers of Presidents Taft and T. R. Roosevelt, although we suspect only a few deal with forest matters. Comparable matter must exist in the files of all our presidents since Grover Cleveland.

The question of what to do with border line cases must have plagued the compiler and librarians. Where does the interest in the forest begin and end? How far should general conservation matters be included? The criteria used in excluding many topics is not discussed. Some might feel that the references should include the papers of botanists like Bartram, Douglas, or Engelmann; of explorers like Lewis and Clark or Jedidiah Smith; or of companies like the Hudson Bay Company. Perhaps such omissions stem from the history of the Foundation itself which was at first, and perhaps still is, more deeply concerned with industry than with the living forest.

The compiler points out that in this initial effort references are provided from only 106 of the 300 institutions contacted. Consequently, we can expect that in the next volume, proposed for five years hence, the Foundation will find still other sources and obtain a wider and more complete coverage. That references to material in some states are not now available is regrettable, especially so as missing are such important timber states as Idaho, Alaska, and Ten-

nessee and the states south of it. Canadian source material is very scanty and with none reported for Alberta, British Columbia, or Newfoundland.

Strange indeed is the lack of historical material from any of the state forestry agencies. Ohio, California, and New York have each had some state forestry activities for nearly 75 years, yet none of these have apparently been preserved. Knowing how casually some original data and records of some public agencies have been kicked around and how indifferently similar material has been considered in minor units, it perhaps should be small wonder that many public forestry agencies have failed to preserve file material. As some of this old matter may still be in existence, it would appear desirable for the many various agencies seriously to look into the problem, and for the Foundation to encourage deposition of old records in some appropriate depository.

One can readily understand the reluctance of various industrial associations and front conservation groups to preserve their records for general public use. Some may have felt that their files would not stand scrutiny by the blue-noses, and some may have felt—or still feel—that their material is none of the public's concern anyway. Despite all such beliefs, the records should be preserved intact. Their sanctity could be preserved by attacking a time-release date fifty years hence. The records of all the various defunct conservation groups should be found, whatever their bearing on the forest situation, and preserved to facilitate an understanding of the part they have played in our economy.

Too few foresters are interested in history; they live in the present and plan for the future. All foresters, regardless of their position or type of activity, do have the responsibility to the profession to see that all manner of records be preserved, not merely for today, but for the future. Those who come after us will want to make their own analysis and appraisal of what we do because we are largely too busy to do it for ourselves.

The Foundation is to be commended for this reference work on the 10th anniversary of its founding, and Miss Neiderheiser for a fine job. She has shown much skill in presenting the references in a uniform manner, but even greater skill and understanding in the detailed and complete index to all the citations. This index makes the book very useful indeed, even though it does not provide a clue as to whether the reference is to a major citation or merely to a minor item in a collection. The Foundation gives credit to 135 sponsors in the forest industries scattered throughout the entire country.

E. N. MUNNS
Concord, California

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Pelican in the Wilderness

By F. Fraser Darling. 380 pp. Illus. Random House Inc., New York. 1956. $5.

It is helpful once in a while to see ourselves through the eyes of another. When the examining eyes are as perceptive as those of F. Fraser Darling, the experience is particularly rewarding. The noted British ecologist has travelled over more of North America than most of us will ever see. Out of his wide experience he has produced a book that can profitably be read and enjoyed by anyone interested in American natural resources and their management.

Dr. Darling, a many sided naturalist, is a leader in the newly developing science of human ecology. He is senior lecturer in ecology and conservation at the University of Edinburgh, and is a member of the Scientific Advisory Council of the Conservation Foundation in this country. In the latter capacity he has frequently visited the United States and has become well acquainted with our problems of resource management.

His book is a highly personal account of his travels across the continent. He tells of rodeos in Arizona, prescribed burning in the Southeast, wildlife reconnaisance in Alaska, and a host of impressions in between. Dr. Darling thinks in the tradition of Aldo Leopold, Olaus Murie, and Sigurd Olson. Like them, he passionately believes that proper land use is a matter of ethics as well as of economics.

His theme is perhaps expressed in a single sentence, "We have got people educated to care for animals, now we have to teach them how to look at country and to shout when they see it being ill-treated." He is no doom-shouter, however. The accomplishments as well as the failures of American conservationists are underscored. The idealism and the enthusiasm of the men in the field were a continual source of amazement to Dr. Darling.

Europeans often criticize Americans who spend a few hurried days abroad, and then return home to write a treatise on European social and political conditions. The same charge might be made against the present volume, but it really does not apply. Overgrazing is as evident in the Scottish highlands as on the Wasatch Plateau; wildlife management principles are much the same in England or in Alaska. There are, however, many minor errors in common names, errors such as a European would be expected to make. They do not detract from the essential worth of the book, but they are conspicuous.

This extremely interesting and readable book treats resource management as a unified whole, including land and people as well as plants and animals. Not everyone will agree with all the ideas expressed. Still, it is stimulating reading for some of us who have been so busy with trees that we have literally been unable to see the forest.

CHARLES F. COOPER
Arizona Watershed Program
Phoenix, Arizona

Forestry as a Profession

Arthur B. Meyer. 16 pp. Illus. Society of American Foresters, Mills Bldg., Washington 6, D. C. 25 cents.

In this bulletin Arthur B. Meyer has rendered a real service to forestry, to potential foresters, and to practicing foresters who must answer question on forestry careers. The text is clearly divided into easily-read sections on Qualifications, Opportunities, and Rewards. This basic information is amplified in specific detail under the headings Public Forestry, Private and Industrial Forestry, Education and Extension, and Allied Fields.

This kind of information has been badly needed for some time. Competitive professions have been publicized to the point where undoubtedly they drain off some good young men who might have become foresters had they known more about it. This bulletin supplies the lack. It will be most effective if forestry agencies and companies will secure copies in large numbers and distribute them to local high schools—particularly to the high school counselors.

In Meyer's approach to the subject he has stressed professional forestry as a career, with intent to inform rather than persuade. However, the bulletin presents forestry so honestly that it cannot help but persuade a young man earnestly seeking guidance. With the desirable type of prospective forester it will do a better job than some of the more glamorized types of career booklets.

The booklet is written with inspiration and will give foresters a sense of pride in reviewing their profession as Meyer sees it. The prospective forester also will find the presentation appealing. The information on forestry education is fine, and the table of forestry schools is a valuable reference.

Reviewers are presumed to be unduly prejudiced in favor of the manuscript unless they growl about something. In this connection, the specific salary figures are certainly useful and Meyer has wisely hedged his statement on federal salaries. Even so, these and other pay rates are changing so rapidly that it might be desirable to stress the constant change in forestry salaries. One other item it that the Junior Forester and Junior Range Conservationist examinations have been superseded by the Federal Service Entrance Examination. These are only flyspecks however, and do not detract from a good job well done. To one who is constantly badgered for this type of information it is most useful and most welcome. Other foresters will find it equally valuable in the recruitment of young men for the profession.

W. F. McCulloch
Oregon State College

Publications of Interest

Federal Timber Sales Policies is the report submitted to the Senate Committee on Interior and Insular Affairs by its Subcommittee on the Legislative Oversight Function as a result of hearings held jointly with the House Committee on Government Operations, Subcommittee on Public Works and Resources, in November 1955, in the Pacific Northwest. Part I of the report, published in August, contains the findings, conclusions, and recommendations of the subcommittee. U. S. Government Printing Office, Washington, D. C.

* * *

Financial Maturity: a guide to profitable timber growing has been released as Technical Bulletin 1146 of the U. S. Department of Agriculture. The bulletin offers a guide to the question when to harvest a tree or stand. Its primary purpose is to present and explain an approach, which is then illustrated by examples from southern pine and hardwood forests. The guide is useful to forest owners who have adopted timber growing as a business on their properties. It is not a substitute for but an aid to the judgment of the forester practicing his art on such a property. The bulletin is written to forest managers—both those now active and the forestry students who may become forest managers.

Copies are available on request from the Southern Forest Experiment Station, 2026 St. Charles Ave., New Orleans 13, La.

* * *

The Farm Quarterly in its autumn issue carries an interesting and factual article entitled "Trees." Concerned primarily with plantation establishment and care, the article will find timely interest in connection with the soil bank provisions of the new farm law. Landowners are encouraged to seek technical advice and the underlying values of farm woodlots are stressed throughout.

* * *

Canadian forest research work as it is carried on by the Forestry Branch of the Department of Northern Affairs and National Resources is discussed in *Research Work of the Forestry Branch*, the Department's miscellaneous publication No. 6. The first section of the booklet describes the history, organization, and the function of the branch and includes an outlook for the future. In the second section of the booklet the same topics are discussed for the Forest Products Laboratories Division. The publication (39 pages) can be ordered from Edmond Cloutier, Queen's printer and controller of Stationery, Ottawa.

* * *

Tractors For Logging (189 pages), published by the Forestry Division of the Food and Agriculture Organization of the United Nations in Rome, Italy, is a detailed study of the use of tractors specifically suited to forestry needs. The effectiveness of types of tractors is discussed in relation to the conditions affecting the work, including topography, economic aspects, and labor available. In addition to describing suitable tractors, the work devotes a section to the calculation of operational costs and includes formulae for determining costs. An extensive bibliography is also included. The price is $2.00.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University of New York College of Forestry*
Range Management Section Compiled by Division of Bibliography, Library, U. S. Department of Agriculture

General

Forestry Problems of the Bonavista Peninsula, Newfoundland. 31 pp. Illus. Canada Dept. of Northern Affairs & National Resources. Forestry Branch, Ottawa. 1956. For. Res. Div. Tech. Note No. 26.

The Giant Sequoias and the Coast Redwoods. 4 pp. U. S. National Park Serv. Region 4, San Francisco 5, Calif. 1956. Mimeog.

Lodgepole Pine. By D. A. Zischke. 12 pp. Plates. U. S. Forest Products Laboratory, Madison 5, Wis. 1956. Rept. No. 2052. Mimeog.

Safety for Tree Workers. By A. R. Thompson. 35 pp. Illus. U. S. National Park Serv., Washington 25, D. C. rev. 1956. Tree Pres. Bul. No. 2. 20 cents (Govt. Print. Off.)

They Knew Paul Bunyan. By E. C. Beck. 256 pp. Univ. of Michigan Pr., Ann Arbor. Nov., 1956. $4.75.

Timber from Terry Forks. By Clara Baldwin. [authentic picture of lumbering] Abingdon Pr., Nashville 2, Tenn. 1956. Ages 8 up. $2.00.

Conservation

Nature's Guardians: Your Career in Conservation. By H. E. Neal. 192 pp. Julian Messner, 8 West 40th, New York. 1956. High School and College Age. $3.50.

Farm Forestry

Management of Woodlots. By W. H. Jolliffe. 19 pp. Illus. New Zealand Forest Serv., Wellington. 1956. Information Ser. No. 19.

Forest Economics

Financial Maturity: A Guide to Profitable Timber Growing. By W. A. Duerr, John Fedkiw and Sam Guttenberg. 74 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1956. Tech. Bul. No. 1146. 30 cents (Govt. Print. Off.)

The Public's Stake in Industrial Forestry. By G. L. Drake. Folder. Prepared for the Winton Lecture in Industrial Forestry . . . School of Forestry, Univ. of California. April 19, 1956.

Forest Management

Forest Management in Plan and Practice: Proceedings of the Fifth Annual Forestry Symposium, School of Forestry, Louisiana State University, Baton Rouge April 5-6, 1956. Publ. by Louisiana State Univ. School of Forestry. Mimeog.

The Form and Taper of Forest-Tree Stems. By H. R. Gray. 78 pp. Imperial Forestry Institute, Univ. of Oxford. 1956. Inst. Paper No. 32. 12s, 6d.

The Horseshoe Properties Forest Management Demonstration; Ten Years of Progress 1945-1955. 15 pp. Illus. TVA, Norris, Tenn. 1956.

Forest Resources

Lake States Timber Resources. By R. N. Cunningham & Survey Staff. 31 pp. Lake States Forest Expt. Sta., St. Paul, Minn. 1956. Station Paper No. 37. Mimeog.

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Decay and Discolourations in Poplar Pulpwood. By E. A. Atwell. 24 pp. Illus. Canada Dept. of Northern Affairs & National Resources. Forestry Branch, Ottawa. 1956. Forest Products Labs. of Canada. Tech. Note No. 1.

Decay Following Logging Injury to Western Hemlock, Sitka Spruce, and True Firs. By Ernest Wright and L. A. Isaac. 34 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1956. Tech. Bul. No. 1148. 15 cents (Govt. Print. Off.)

Protection

Chemical Retardants for Wild Land Fire Control. By H. R. Miller. 5 pp. California Forest & Range Expt. Sta., Berkeley. 1956. Forest Res. Notes No. 105. Mimeog.

Fire Weather Measurements in Southeast Alaska, 1955. By R. C. McGregor. 2 pp. Alaska Forest Research Center, Juneau. 1956. Tech. Note No. 30. Mimeog.

Some Economics of Fire Control in New Hampshire. By O. P. Wallace. 2 pp. New Hampshire Agric. Expt. Sta., Durham. 1956. For. Mimeog. No. 4.

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Hardwood Control and Increased Forage Production in Scrub Hardwood-pine Stands Treated with Aerial Application 2, 4, 5-T and Solvex. 5 pp. Illus. Texas Agric. Expt. Sta., College Station. Progress Report 1852. 1956.

Native Grasses, Legumes, and Forbs. (Section II of a Series: Pasture and Range Plants). 38 pp. Illus. Phillips Petroleum Co., 466 Adams Bldg., Bartlesville, Okla. 1956. Free.

Pasture Firebreaks; Construction and Species Trial on Pond Pine Sights in North Carolina. By W. O. Shepherd, R. H. Hughes, E. U. Dillard, and J. L. Rea. 33 pp. Illus. North Carolina. Agric. Expt. Sta., Raleigh, Bul. 398. 1956.

A Study of Percent of Plants Grazed Method of Utilization Determination and its Application. By J. E. Mattox. 140 pp. Illus. Montana Agric. Expt. Sta. Bozeman. Mimeograph Circ. 88. 1955.

Silviculture

Eight-Year Survival and Height Growth of Sugar Maple Seed Source Planting. By T. G. Zarger. 4 pp. Tables. TVA, Norris, Tenn. 1956. Tech. Note No. 22. Mimeog.

Site-Types, Growth and Yield at the Lake Edward Forest Experimental Area, Quebec. By R. G. Ray. 53 pp. Illus. Canada Dept. of Northern Affairs & National Resources. Forestry Branch, Ottawa. 1956. For. Res. Div. Tech. Note No. 27.

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Absorption and Penetration of Oil Soluble Wood Preservatives Applied by Dip Treatment. By F. L. Brown, R. A. Moore and R. A. Zabel. 38 pp. Illus. State Univ. of New York College of Forestry, Syracuse. 1956. Tech. Publ. No. 79. 40 cents.

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Jahresbericht über Holzschutz (Annual Report on Wood Protection) 1953/54. Ed. by Günther Becker and Gerda Theden. 219 pp. Unter den Eichen 87, Berlin-Dahlem, 1955. In German and English. About $11.00.

Wood Technology and Utilization

The Anatomy of the Timbers of the Southwest Pacific Area; III . . .; IV. By H. D. Ingle and H. E. Dadswell. Illus. Australia Commonwealth Sci. & Indus. Research Org. Div. of Forest Products. 1953, 1956. Reprints Nos. 192 and 279.

Effect of Growth Zone on Specific Gravity and Percentage of Summerwood in Wide-Ringed Douglas-Fir. By Diana Smith. 9 pp. Tables. U. S. Forest Products Lab., Madison, Wis. 1956. No. 2057. Mimeog.

Engelmann Spruce; Its Properties, Uses, & Production. By I. V. Anderson. 16 pp. Illus. Intermountain Forest & Range Expt. Sta., Ogden, Utah. 1956. Research Paper No. 39. Mimeog.

The Nature of Reaction Wood. v. The Distribution and Formation of Tension Wood in Some Species of Eucalyptus. By A. B. Wardrop. pp. 152-166. Illus. Australia Commonwealth Sci. & Indus. Research Org. Div. of Forest Products. 1956. Reprint No. 283.

Requirements and Properties of Adhesives for Wood. By R. A. G. Knight. 23 pp. Great Britain Dept. of Sci. & Indus. Research. Forest Products Res. 1956. Bul. No. 20. 2s.

Specific Gravity of Populus Species and Hybrids. By B. H. Paul. 9 pp. Plates. U. S. Forest Products Lab., Madison, Wis. 1956. Rept. No. 2060. Mimeog.

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Society Affairs

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The President's Column

DEWITT NELSON

Three meetings of national importance were held in October. The American Forestry Association and the Association of State Foresters met at La Plata, Maryland, during the first week of the month. From October 15 to 19 the Society of American Foresters held its annual meeting in Memphis, Tennessee.

These meetings differed, but each complemented the other. The A.F.A. meeting of 500, mostly laymen, studied the small woodlot problem—its difficulties, its opportunities, and its importance to the nation's total timber economy.

The state foresters were concerned with operational and administrative problems as well as federal, state, and private forest cooperative programs, including the current revision of the Clarke-McNarry Fire Protection Area and Cost Survey.

The Society meeting in Memphis was outstanding. More than a thousand foresters from all over the country received first hand information on the dynamic growth of forestry in the South. Forests and forest industries are changing the economy of that great southern area. It is also well to note that similar transitions are taking place in other forested regions.

Never before have the opportunities and the responsibilities of the professional forester been so great. No two properties will require or respond to the same treatment. The forester must have a full knowledge of methods and techniques that can be mixed and blended to meet a wide variety of problems. He must have the courage and ability to sell them to management—both large and small. On his knowledge and his decisions will rest the future of the industry and the economy of large areas and many people.

The summer field season is now closed. The Sections will be holding their winter meetings and the Chapters will return to their monthly meeting schedules. Every forester should attend and participate in order to enlarge his knowledge and extend his influence. If you, as individuals or as groups, have any suggestions for improving the services of the Society, do not hesitate to communicate with either Henry Clepper or me.

Central States Section Holds Annual Meeting

The annual meeting of the Central States Section of the S. A. F. was held on September 10-11 at Camp Muskingum, near Leesville, Ohio. Vice Chairman C. S. Walters presided in the absence of Chairman Robert Merz. Eighty-six members were present, including charter member Professor B. N. Prentice of Purdue University.

At the business meeting on the evening of the 10th reports of officers and Section committees were given. The Nominating Committee announced the automatic advancement of the vice chairman and the continuation in office of the secretary-treasurer for the second year of his two-year term. Nominations for vice chairmen were then presented.

The slate of officers for the coming year are as follows:

Chairman, Charles S. Walters, Illinois Agricultural Experiment Station, Urbana.

Vice chairman, Allyn M. Herrick, Department of Forestry and Conservation, Purdue University, West Lafayette, Ind.

Secretary-treasurer, Alfred N. Liming, Department of Forestry and Conservation (Extension), Purdue University, Versailles, Ind.

Following the business session an illustrated talk concerning the Muskingum Watershed Conservancy District was given by Howard Mendenhall, as-

sistant secretary of the district. Tuesday's session consisted of field trips in the district.

Allegheny Section Holds Late Summer Meeting

The annual summer meeting of the Allegheny Section was held on the Eastern Shore of Maryland at Ocean City, September 7 and 8, with 125 members and guests in attendance.

On Friday, September 7, the party went on a field trip by bus to private woodlands and the Pocomoke State Forest. Visits were made to research projects in various phases of forest management including experiments in chemical control of hardwoods, prescribed burning under a shelterwood system, and mechanical treatment of soil for planting.

John J. Mohr, local state district forester, and Silas Little of the Allegheny Forest Experiment Station were the tour leaders.

At the dinner, served in The Shoreham, Williiam C. Bramble, Section chairman presided. Fred W. Besley, first state forester of Maryland and Fellow of the Society, was introduced. Following a short business session, Henry Clepper discussed Society affairs.

A tour to various local forest products industries was taken on Saturday morning. The meeting adjourned at noon.

The Section's winter meeting will be held in Baltimore in February 1957.

Coming Events

Southern California Section

The Southern California Section will hold its fall meeting on December 7 and 8 at the Arrowhead Springs Hotel in San Bernardino.

Upper-Mississippi Valley Section

The winter meeting of the Upper-Mississippi Valley Section is scheduled for February 1 and 2 in Memorial Union, Iowa State College, Ames, Iowa.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatements received in the Society officer during the month of September are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of December 1, 1956. Communications from voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Junior Grade

Hartman, D. W., Box 98, Franklin, W. Va. U., B.S.F., 1956 (Student, 1954).

Appalachian Section

Student Grade

DUKE UNIVERSITY

McGee, Charles E.

Junior Grade

Messenger, A. S.; Forester, Virginia Forest Service,; N. C. State, B.S.F., 1953.

Sabin, J. S., Jr., District Ranger, U. S. Forest Service, Marion, Va.; State Univ. of N. Y., B.S.F., 1951.

Underhill, L. T., Forester, Glatfelter Pulp Wood Co., Fredericksburg, Va.; Pa. State, B.S.F., 1956.

Wilfong, D. G., Jr., Rt. 3, Box 34 A., Charlottesville, Va. Reinstatement.

Member Grade

Crank, P. F., Jr., Consulting Forester, Point Harbor, N. C., N. C. State, B.S.F., 1952. (Junior, 1953).

Davison, A. T., Acting Supt., Duke Forests, N. C., Duke, M.F. 1950. (Junior, 1951).

Della-Bianca, L., Forester, U. S. Forest Service, Union, S. C., Mich. State, B.S.F. 1950, Mich. State, M.F. 1953. (Junior, 1952).

Johnston, J. F., Jr., Gen. Mgr., Cape Fear Wood Corp., Elizabethtown, N. C., N. C. State, B.S.F. 1949. (Junior, 1952).

LeRoy, J. L., Timber Appraiser, Hartwell Dam and Reservoir, Hartwell, Ga., N. C. State, B.S.F., 1952 (Junior, 1952).

Scholtes, W. E., Forester, Halifax Paper Co., Roanoke Rapids, N. C., N. C. State, B.S.F., 1951. (Junior, 1951).

Affiliate Grade

Mease, J. C., Field Technician, International Paper Co., Whiteville, N. C.

Parris, R. B., Jr., Forester, Continental Can Co., Inc., Hopewell, Va.

Tupper, J. L., Administrative Asst., W. Va. Pulp & Paper Co., Summerville, S. C.

Central Rocky Mountain Section

Junior Grade

Schmunk, O. H., Forester, Colo. State Forest Service, Steamboat Springs, Colo., Colorado A & M, B.S.F., 1953.

Member Grade

Chapin, W. E., Forester, Bureau of Land Mgmt., Denver, Colo., Colorado A & M B.S.F. 1949. (Junior, 1951).

Central States Section

Junior Grade

McCuddy, C. A., 2106 Milburn Blvd., Mishawaka, Ind., Purdue, B.S.F., 1956. (Student, 1954).

Member Grade

Olson, P. L., Farm Forester, Ill. Div. of Forestry, Cambridge, Ill., Iowa State, B.S.F., 1950. (Junior, 1951).

Columbia River Section

Member Grade

Amrhein, G. C., Forester, Bureau of Land Mgmt., Medford, Ore., Purdue B.S.F., 1952. (Junior, 1952).

Cheatham, J. L., III, Forester, Bureau of Land Mgmt., Lakeview, Ore., Colo. A & M, B.S.F., 1951. (Junior, 1952).

Christie, J. L., Jr., Forester, Ore. State Board of Forestry, Astoria, Ore., Ore. State, B.F., 1953. (Junior, 1953).

Howell, W. H., Forester, I. F. Miller Lumber Co., Monroe, Ore., W. Va. Univ., B.S.F., 1950; Ore. State, M.F. 1951. (Junior, 1950).

Juhl, T. C., Jr., Forester, U. S. Forest Service, Detroit, Ore., Ore State, B.S.F., 1951. (Junior, 1951).

Knechtel, W. C., Forester, U. S. Forest Service, Lakeview, Ore., Pa. State., B.S.F. 1951. (Junior, 1951).

Mosar, M. A., Forester, Crown Zellerbach Corp, Cathlamet, Wash., Ore. State, B.S.F., 1951. (Junior, 1951).

Sorensen, N. P., Cruiser & Engineer, Springfield Lbr. Mills, Eugene, Ore., Ore. State, B.S. Forest Engineering, 1949. (Junior, 1953).

Tindall, R. W., Forester, Bureau of Land Mgmt., Coos Bay, Ore., Univ. of Wash., B.S.F., 1951. (Junior, 1951).

Tomascheski, J. D., Timber Buyer, Western States Plywood Corp., Port Orford, Ore., Iowa State, B.S.F., 1951. (Junior, 1952).

Trappe, J. M., Forester, Blue Mtn. Research Center, La Grande, Ore., Univ. of Wash., B.S.F., 1953; State Univ. of N. Y., M.F., 1955. (Junior, 1953).

Young, E. S., Logging Supt., Crown Zellerbach Co., Lees Camp, Ore., Ore. State, B.S.F., 1921. (Junior, 1952).

Gulf States Section

Student Grade

LOUISIANA POLYTECHNIC INSTITUTE

Reed, A. W.

Member Grade

Burns, R. M., Forester, U. S. Forest Service, Oxford, Miss., Mich. State, B.S.F., 1950. (Junior, 1951).

Holmes, J. L., President, Pinetree, Inc., Winnfield, La., (Junior, 1953).

LeBlanc, W. J., Field Asst., International Paper Co., Amite, La., La. State, B.S.F., 1950. (Junior, 1951).

Peters, L. C., Forester, Frank W. Bennett and Assocs., Baton Rouge, La., La. State, B.S.F., 1950; Yale, M.F., 1951. (Junior, 1952).

Readinger, E. H., Forester, Gaylord Container Co., Franklinton, La. Iowa State, B.S.F. 1951. (Junior, 1952).

Richardson, J. W., Forester, International Paper Co., Amite, La., A.P.I., B.S.F., 1949. (Junior, 1951).

Troskey, F. T., Forester, Chicago Mill and Lumber Co., Greenville, Miss., Purdue, B.S.F., 1953. (Junior, 1953).

Inland Empire Section

Junior Grade

Holmes, G., District Ranger, U. S. Forest Service, Clarkia, Idaho, Mont. State, B.S.F. 1949.

Johnson, A. B., Forester, U. S. Forest Service, St. Maries, Idaho, Univ. of Idaho, B.S.F. 1950.

Member Grade

Hunt, L. D., Forester, Potlatch Forests, Inc., Headquarters, Idaho, Univ. of Idaho, B.S.F., 1950. (Junior, 1952).

Karr, R. W., Forest Ranger, U. S. Forest Service, Kingston, Idaho. Mont. State, B.S.F., 1953. (Junior, 1953).

McCarthy, R. J., Forester, U. S. Forest Service, Priest River, Idaho. Pa. State, B.S.F. 1952. (Junior, 1952).

Intermountain Section

Member Grade

Grimes, P. D., Asst. Dist. Ranger, U. S. Forest Service, Garden Valley, Idaho. Iowa State, B.S.F., 1950. (Junior, 1951).

Haupt, H. F., Forester, Boise Research Center, Boise, Idaho, Univ. of Idaho. B.S.F., 1948; Univ. of Idaho., M.F., 1951. (Junior, 1951).

Rupp, C. W., Asst. Forest Ranger, U. S. Forest Service, Lowman, Idaho, Pa. State, B.S.F., 1953. (Junior, 1953).

Tschannen, L. E., Dist. Forester, Emmett, Idaho, Univ. of Mo., B.S.F., 1950. (Junior, 1951).

Kentucky-Tennessee Section

Member Grade

Hawkins, W. T., Forester, Koppers Co., Inc., Memphis, Tenn., Duke, M.F., 1950. (Junior, 1950).

Mount, P. R., Forester, U. S. Army, Clarksville, Tenn., Univ. of Maine, B.S.F., 1952; Yale, M.F., 1953. (Junior, 1952).

Pleasonton, A., Research Asst., Univ. of Tenn., Grand Junction, Tenn., Yale, M.F., 1952. (Junior, 1952).

Reynolds, G. L., Asst. Procurement Mgr., Koppers Co., Inc., Memphis, Tenn., La. State, B.S.F., 1951. (Junior, 1951).

Sturdivant, A. E., Forester, Kentucky River District, Hazard, Ky., W. Va. Univ., B.S.F., 1951. (Junior, 1952).

New England Section

Member Grade

Burgess, S. L., Forester, Oxford Paper Co., Rumford, Me., Univ. of Maine, B.S.F., 1947. (Junior, 1952).

Merchant, G. C., Forester, International Paper Co., Stratford, N. H., Univ. of Maine, B.S.F., 1950. (Junior, 1952).

New York Section

Affiliate Grade

Yavorsky, J. M., Assoc. Prof. State Univ. of N. Y., N. Y. State, B.S. (Wood Tech.), 1942; M.F. (Forestry Util.) 1947; Ph.D. (Forestry Util.) 1955.

Northern California Section

Member Grade

Bones, W. F., Jr., Forester, Bureau of Land Mgmt., Redding, Calif., Utah State, B.S.F., 1951. (Junior, 1951).

Dougherty, R. H., Buyer, Anderson Pole Co., Anderson, Calif., Ore. State, B.S.F., 1941. (Junior, 1952).

Dunham, M. A., Forester, The Diamond Match Co., Paynes Creek, Calif., Univ. of Calif., B.S.F., 1952. (Junior, 1952).

Eden, C. J., Asst. Forest Tech., California Div. of Forestry, Magalia, Calif., Univ. of Calif., B.S.F., 1949. (Junior, 1952).

Heyden, R. E. C., Jr., Forester, Pacific Gas and Electric Co., San Francisco, Calif., Univ. of Calif., B.S.F., 1951. (Junior, 1951).

Howard, B., Asst. Chief, U. S. Forest Service, San Francisco, Calif. Reinstatement.

McCluskey, G. E., Forester, U. S. Forest Service, Foresthill, Calif., Univ. of Calif., B.S.F., 1951. (Junior, 1951).

McNie, J. C., Forester, Mich-Calif. Lumber Co., Camino, Calif., Ore. State, B.S.F., 1951. (Junior, 1952).

Rose, J. A., Forester, B. L. M., Sacramento, Calif., Univ. of Calif., B.S.F. 1953; Yale, M.F. 1956. (Junior, 1953).

Schori, M. O., Forest Ranger, Calif. Div. of Forestry, Yreka, Calif., Univ. of Calif., B.S.F., 1947. (Junior, 1951).

Spaulding, J. G., Timber Mgr., G. L. Saeier Co., Arcata, Calif. (Junior, 1948).

Tripp, C. E., Forester, Blister Rust Control, Tahoe Nat'l Forest, Univ. of Maine, B.S.F., 1951. (Junior, 1952).

Wray, C. J., Instructor of Forestry, Lassen Jr. Col., Susanville, Calif., Wash. State, B.S.F. 1950; Duke, M.F., 1951. (Junior, 1952).

Northern Rocky Mountain Section

Junior Grade

Weber, J. J., Work Unit Conservationist, S.C.S., Three Forks, Mont., Mont. State., B.S.F., 1949.

Ozark Section

Junior Grade

Schwedland, J. E., Forester, Crossett Forestry Div., The Crossett Co., Crossett, Ark., Yale, M.F., 1950.

Member Grade

Brooks, C. R., Asst. District Ranger, U. S. Forest Service, Mena, Ark., Univ. of Mich., B.S.F., 1951. (Junior, 1951).

Deed, R. N., Management Asst., Ark. State Forestry, Benton, Ark., Univ. of Mo., B.S.F., 1950. (Junior, 1951).

Dressel, A. T., Field Asst., International Paper Co., Amith, Ark., Univ. of Mo., B.S.F., 1950. (Junior, 1951).

Preigel, E. R., Forester, Cole County Lumber Co., Jefferson City, Mo., Okla. A &M, B.S.F., 1950. (Junior 1952).

Renard, L. P., Asst. to Gen. Supt., Dierks Forests, Inc., DeQueen, Ark., Iowa State, B.S.F., 1951. (Junior, 1951).

Schock, J. H., Forester, Dierks Forests, Inc., Winthrop, Ark., Iowa State, B.S.F., 1951. (Junior, 1951).

Wylie, J. E., Farm Forester, Warrenton, Mo., Ore. State, B.S.F., 1949. (Junior, 1950).

Puget Sound Section

Member Grade

Avery, R. G., Forester, Scott Paper Co., Everett, Wash., Univ. of Wash., B.S.F., 1950. (Junior, 1953).

Johnson, R. E., Mgr., West Tacoma Newsprint Co., Steilacoom, Wash., Univ. of Wash., B.S.F., 1951. (Junior, 1951).

Kantzer, C. J., Logging Engr., Scott Paper Co., Everett, Wash., Univ. of Wash., B.S.F., 1949. (Junior, 1952).

Powell, A. W., Road Engr., Anacortes Veneer Inc., Anacortes, Wash., Univ. of Wash., B.S.F., 1951. (Junior, 1951).

Associate Member

Wagner, G. C., Vice Pres. and Treas., St. Paul and Tacoma Lumber Co., Tacoma 1, Wash., Sheffield Scientific School, Ph.B., (Forestry) 1916.

Southeastern Section

Junior Grade

Arther, B. J., P. O. Box 672, Opelika, Ala., Ala. Poly. Inst., B.S.F., 1956. (Student, 1954).

Hewlett, J. D., Coweeta Hydrologic Lab., Dillard, Ga., Reinstatement.

Gentry, J. B., Box 8, Campus Station, Athens, Ga., Univ. of Ga., B.S.F., 1956. (Student, 1956).

Layson, A. W., Lynnwood Apts., #13, Lynn Ave., Athens, Tenn., Univ. of Ga., B.S.F., 1956. (Student, 1955).

Lightsey, A. L., Surrency, Ga., Univ. of Ga., B.S.F., 1956. (Student, 1956).

Lynch, D. G., Forester, Brunswick Pulp and Paper Co., Waycross, Ga. Reinstatement.

Matthews, H. W., Jr., Box 96, McRae, Ga. Reinstatement.

McAlexander, M. R., Route 2, Cedar Grove, Tenn., Univ. of Ga., B.S.F., 1956. (Student, 1956).

Wall, J. H., 502 North Isabella St., Sylvester, Ga., Reinstatement.

Weldy, W. E., 258 Magnolia Hall, Auburn, Ala., Ala. Poly. Inst., B.S.F. 1956. (Student, 1954).

Member Grade

Albright, T. B., Timber Buyer, 609 South 15th St., Leesburg, Fla., Univ. of Fla., B.S.F., 1950. (Junior, 1951).

Black, W. B., Forest Analyst, Gulf States Paper Corp., Tuscaloosa, Ala., Ala. Poly. Inst., B.S.F., 1951. (Junior, 1952).

Carson, W. G., Forester, Rome Kraft Co., Gainesville, Ga., N. Y. Col. of For., B.S.F., 1951. (Junior, 1952).

Creech, G. L., Manager, St. Regis Paper Co., Bryceville, Fla., Univ. of Ga., B.S.F., 1953. (Junior, 1953).

Davis, W. H., Forest Statistician, International Paper Co., Panama City, Fla. Univ. of Ga., B.S.F., 1951. (Junior, 1951).

Dew, E. S., Forester, Hudson Pulp and Paper Corp., Shamrock, Fla., Univ. of Fla., B.S.F., 1951. (Junior, 1952).

Edson, J. A., Forester, St. Regis Paper Co., Pensacola, Fla., Univ. of Fla., B.S.F., 1953. (Junior, 1953).

Ference, G. M., Forester, Brunswick Pulp and Paper Co., Brunswick, Ga., Pa. State, B.S.F., 1950; Duke, M.F., 1951. (Junior, 1951).

Gresham, T. A., Forester, Rome Kraft Co., Newman, Ga., Ala. Poly. Inst., B.S.F., 1950. (Junior, 1953).

Halls, L. K., Range Conservationist, U. S. Forest Service, Tifton, Ga., Colo. A&M Col., B.S.F., 1947; Texas A&M, 1948. (Junior, 1952).

Horan, D. F., Consultant Forester, 316 Windsor, Lakeland, Fla., Univ. of Fla., B.S.F., 1950. (Junior, 1951).

Jordan, R. A., Nurseryman, Fla., Forest Service, Milton, Fla., Ala. Poly. Inst., B.S.F., 1950. (Junior, 1952).

Larsen, H. S., Forester, Southern Timber Mgmt. Ser., Inc., Birmingham 5, Ala., Mich. State, 1953. (Junior, 1953).

Locke, W. J., Forester, International Pa-

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per Co., Bainbridge, Ga., Univ. of Fla., B.S.F., 1950. (Junior, 1951).

Malac, B. F., Forester, Union Bag-Camp Paper Corp., Savannah, Ga., Duke, M.F., 1952. (Junior, 1953).

McKelvey, C. G., Jr., Asst. Mgr., Hudson Pulp & Paper Corp., Palatka, Fla., Univ. of Ga., B.S.F., 1950. (Junior, 1951).

Nelson, T. C., Forester, U. S. Forest Service, Asheville, N. C., Mich. State, M.F., 1947; Mich. State, Ph.D., 1950. (Junior, 1950).

Nye, W. K., Forester, H. and W. Division of Scott Paper Co., Mobile, Ala., Ala. Poly. Inst., B.S.F., 1951. (Junior, 1951).

Read, R. M., Jr., Forester, U. S. Army, Ft. Gordon, Ga., Purdue, B.S.F., 1952. (Junior, 1952).

Roger, J. W., Forester, Lee Tidewaters Cypress Co., Copeland, Fla., Univ. of Fla., B.S.F., 1950. (Junior, 1951).

Rowell, J., Forester, International Paper Co., Panama City, Fla., Ala. Poly. Inst., B.S.F., 1949, (Junior, 1952).

Schmitt, R. H., Forest Supt., Nahunts, Ga., Mich. State, B.S.F., 1950. (Junior, 1951).

Vessels, J. L., Asst. Forest Mgr., St. Regis Paper Co., Fargo, Ga., Univ. of Fla., B.S.F. 1951. (Junior, 1951).

Wakefield, R. C., Owner, Clay Timber Products Co., Lineville, Ala., Ala. Poly. Inst., B.S.F. 1949. (Junior, 1952).

Affiliate Grade

McCullar, W. C., Forester, Georfia Kraft Co., Macon, Ga., Okla. A&M, B.S. Forestry), 1952.

Southwestern Section

Member Grade

Olson, C. H., Dist. Ranger, Sedona, Ariz., Univ. of Minn., B.S.F. 1947. (Junior, 1951).

Shumate, J. B., Forester, Tonto Nat'l Forest, Phoenix, Ariz., Ore. State, B.S.F., 1947. (Junior, 1952).

Ziegler, R. C., Sr., Asst. Dist. Forest Ranger, U. S. Forest Service, Santa Fe., N. Mex., Mont. State, B.S.F., 1951. (Junior, 1951).

Upper-Mississippi Valley Section

Junior Grade

Marshall, W. J., Forester, Itasca County, Grand Rapids, Minn., Univ. of Minn., B.S.F., 1949. (Affiliate, 1954).

Member Grade

Coyer, E. L., Forester, Diamond Match Co., Orr, Minn., Univ. of Minn., B.S.F., 1950 (Junior, 1951).

French, D. W., Asst. Prof., Univ. of Minn., St. Paul 1, Minn., Univ. of Minn., B.S.F., 1943; M.F., 1943; M.F., 1949; Ph.D., 1952. (Junior, 1952).

Hamilton, L. R., Forester, Hinckley, Minn., Univ. of Minn., B.S.F., 1953. (Junior, 1953).

Torgerson, K. G., Forester, Kimberly-Clark of Minn., Inc., Duluth 2, Minn., Univ. of Minn., B.S.F., 1951. (Junior, 1951).

Wisconsin-Michigan Section

Junior Grade

Christensen, D. E., 6011 Sonny Ave., Flushing, Mich., Mich. State, B.S.F., 1956. (Student, 1955).

Hittenrauch, H. R., 1754 N. Sandstone Rd., Jackson, Mich., Mich. State, B.S.F., 1956. (Student, 1954).

Larmore, F. D., 955 Three Mile Rd., N. E., Grand Rapids, Mich., Mich State, B.S.F., 1956. (Student, 1956).

Wowianko, W. B., Engineer, Romkins Johnson Co., Jackson, Mich., Mich. State, B.S.F., 1937.

Member Grade

Grosch, W. C., Jr., Park Supt., Milwaukee County Park Comm., Wis., Univ. of Idaho, B.S.F., 1950. (Junior, 1952).

Hartig, R. R., Project Asst., Univ. of Wis., Purdue, B.S.F., 1953. (Junior, 1953).

Larson, P. R., Forester, U. S. Forest Service, Rhinelander, Wis., Univ. of Minn., B.S.F., 1949; M.F., 1952. (Junior, 1951).

Lodholz, D. H., Forester, Wis. Cons. Dept., Tomahawk, Wis., Mich. State, B.S.F., 1951. (Junior, 1952).

Sainio, E. N., Consulting Forester, Newberry, Mich., Mich. State, B.S.F., 1943. (Junior, 1953).

Schmeling, R. E., Woodlands Mgr., Escanaba Paper Co., Escanaba, Mich., Mich. State, B.S.F., 1941; M.F., 1942. (Junior, 1952).

Foreign

Junior Grade

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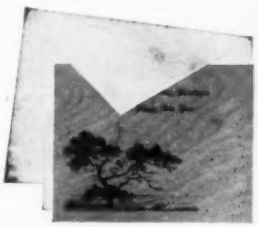

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Forestry News

E. L. Demmon Retires

Elwood L. Demmon, director of the Southeastern Forest Experiment Station, Asheville, N. C., retired October 31 after 31 years with the U. S. Forest Service. He is a Fellow of the Society of American Foresters, the highest honor bestowed by the Society, and served as its president for two years. He is a fellow of the American Association for the Advancement of Science, served as director of the American Forestry Association, as president of the New Orleans Academy of Science, and as a member of a special committee on natural resources for the National Research Council. He received the distinguished alumni service award from the University of Michigan in 1954, and a distinguished service award from the Secretary of Agriculture in 1956.

Mr. Demmon was born in Kendallville, Ind. and received his A. B. and M. S. degrees in forestry from the University of Michigan in 1914 and 1916. He was first employed at the Southern Experiment Station at New Orleans in 1925 and became its director three years later. Between 1944 and 1951 he was director of the Lake States Experiment Station at St. Paul, Minn.

E. L. Demmon

Southern Forest Insect Work Conference Held

The first annual meeting of the Southern Forest Insect Work Conference was held September 11 and 12 at Athens, Ga. Forty workers representing the Forest Service, the Agricultural Research Service, several state forestry agencies, universities, and forest industries were in attendance.

The conference was organized last February to advance the science and practice of forest entomology in the South, to provide a medium of exchange of professional thought, and to serve as a clearing house for technical information on forest insect problems of the region.

L. W. Orr, chief, Division of Forest Insect Research, Southern Forest Experiment Station, was program chairman. Informal sessions on forest insect surveys, survey techniques, research, and control were conducted. Timber losses due to insects were summarized, insect control programs described and discussed, and research programs and needs reviewed.

Particular interest was shown in the destructive pine bark beetles. A committee was appointed to prepare a set of guidelines for aerial and ground

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surveys of southern pine bettle outbreaks; another was set up to establish uniformity in common names of southern insects.

R. J. Kowal, chief, Division of Forest Insect Research at the Southeastern Experiment Station, is chairman of the Southern Forest Insect Work Conference. R. E. Lee, Union Bag-Camp Paper Corp. is secretary-treasurer. Counselors are: R. E. Heinz, Gaylord Container Corp.; L. O. Warren, University of Arkansas; and L. W. Orr, Southern Forest Experiment Station. R. P. Harrison, Athens-Macon Research Center, handled local arrangements for the meeting.

Douglas-Fir Authority Retires; Takes FAO Assignment

Retirement of Leo A. Isaac, internationally recognized authority on Douglas-fir silviculture of the Pacific Northwest Forest and Range Experiment Station at Portland, Ore., was effective October 1.

Immediately following his retirement, Mr. Isaac left for a year's assignment in Turkey, under the technical assistance program of the FAO. His duties will involve advising the

LEO A. ISAAC

Turkish government on all phases of planting forest trees, including selection of areas and tree species used. He will be headquartered in Ankara.

A research worker at the Forest Service Experiment Station for the past 32 years, Isaac has received many honors for his accomplishments in the field of forest research. He is the author of more than fifty publications, which are widely accepted as a basic guide for silvicultural management of Douglas-fir.

In 1946, Mr. Isaac was awarded the Agnes Healy Anderson fellowship at the University of Washington. During this time, he wrote "Better Douglas-fir Forests from Better Seed," a booklet incorporating knowledge gained from two decades of heredity investigations.

In 1951, he received the Outstanding Achievement in Silviculture Award at the 100th anniversary of the University of Minnesota. This award is reserved for alumni who have attained distinction in their field of work.

The following year, Isaac was presented with the Western Forestry and Conservation Association Award for Outstanding Achievement in the field of forestry.

In 1953, at the request and expense of the West German Government, he attended the Forestry Congress of Western European Countries as advisor on use of American trees in European forests. That same year, he was elected a Fellow of the Society of American Foresters.

In 1954, Isaac received the Superior Service Award of the U. S. Department of Agriculture "for research that

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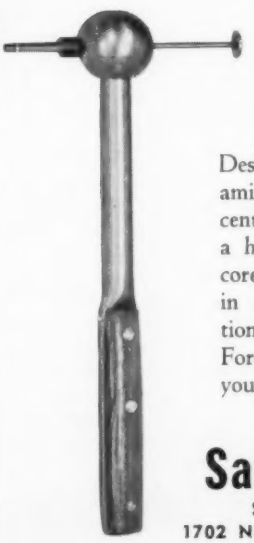

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Originally almost one-third of Nebraska was in woodlands, concentrated along the Missouri and Platte rivers and, to an extent, along the lower reaches of feeder streams and on two highland areas to the northwest. However, today the forest area has shrunk slightly to cover about 1,250,000 acres.

There are no state forests, nor private tree farms. The Badlands in the northwest,—a southern extension of the Black Hills of South Dakota,—contain the Pine Ridge and Wildcat Ranges, both heavily forested areas.

The Nebraska National Forest, in the north central part of the state, is divided into two sections: the Niobrara Forest, bordering the river of the same name, and the Halsey Forest in the center of the state. Together, these comprise 205,000 acres with other wooded areas in individual ownership.

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has gained for him world-wide recognition as the outstanding authority on Doglas-fir silviculture."

He was honored in October of this year by the Society of American Foresters' Award for Outstanding Achievement in Biological Research. The award was made at the Society's annual meeting held at Memphis, Tenn.

Important publications by Isaac include a government bulletin, "Factors affecting establishment of Douglas-fir seedlings," and a booklet published by the Charles Lathrop Pack Forestry Foundation, "Reproductive Habits of Douglas-fir."

A native of Wisconsin, Isaac began his Forest Service career on the Chelan National Forest in Washington in 1920. In addition to affiliation with a number of honorary societies, he is a member of the Society of American Foresters, Ecological Society of America, Northwest Scientific Association, and Oregon Academy of Sciences.

Forest Fire Protection Needs Studied

More fire protection has been recommended for state and privately owned forest land by a group of forestry leaders, the U. S. Department of Agriculture announces. To determine how much more protection is needed and to what extent public and private agencies should participate. These leaders recommend the Forest Service hire a private firm or organization to conduct a study.

These men from forest industries, schools, and conservation organizations, who met recently (August 8-9) near Pontiac, Mich., urge that the study establish a dollar value on the resources of state and private lands which will serve as a basis for determining what should be spent to protect those lands. The meeting was called jointly by Richard E. McArdle, chief of the Forest Service, and A. D. Nutting, president of the Association of State Foresters, to get a cross section of opinion on forest fire protection needs on state and private lands and how to meet those needs. It was further suggested that the study determine what percent of the total public expense the federal government should bear.

In determining the resource values of lands to be protected, whoever makes the study, they agreed, should consider such factors as: the number of woods and mill operations dependent on the forests; the amount of invested capital in forest industries; the economic losses that could be expected to follow fires of varying severities; the losses to recreation, wildlife, forage, and water resources and the industries dependent on them.

The group particularly urges that the study be handled by a competent and nationally recognized organization or firm. They also suggested the firm might retain consultants who are technical experts and representatives of all forestry groups.

Although the men meeting in Michigan are not organized as an advisory committee, they requested an opportunity to meet representatives of the contractor, the Forest Service, and the Association of State Foresters before the study starts. Attending the meeting were: Stanley G. Fontanna, dean, School of Natural Resources, University of Michigan; W. F. McCulloch, dean, School of Forestry, Oregon State College; L. J. Freedman, vice-president (retired), Penobscot Chemical Fibre Co.; J. E. McCaffrey, vice-president, International Paper Co.; C. G. McLaren, vice-president, National Container Corporation; John L. Aram, president, Boise-Payette Lumber Co.; Charles L. Wheeler, vice-president, Pope and Talbot, Inc.; Ernest F. Swift, executive secretary, National Wildlife Federation; A. D. Nutting, forest commissioner, Augusta, Me.; M. M. Bergman, State Chief of Fire Control, Lansing, Mich.; C. H. Coulter, state forester, Tallahassee, Fla.; Homer G. Lyon, Jr., Office of the Secretary, U. S. Department of Agriculture; W. S. Swingler, assistant chief, Forest Service; J. N. Diehl, Division of Cooperative Fire Control, Forest Service; F. W. Godden, Division of Cooperative Fire Control, Forest Service.

H. Dean Cochran Retires From Forest Service

H. Dean Cochran retired October 31 from his position as regional forester for the North Central Region of the Forest Service at Milwaukee, Wis.

Mr. Cochran has been with the Forest Service 36 years, having started as a forest assistant in Colorado in 1920. He later became assistant regional forester in the Rocky Mountain Region, and chief of the Division of Personnel Management for the Service in Washington, D. C., between 1942 and 1954.

He was awarded an honorary doctor

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of science degree by the Colorado Agricultural College in 1945, and received a superior service award from the Secretary of Agriculture in 1954.

He was born in Keokuk, Iowa, and received his A. B. degree from Illinois College at Jacksonville in 1918 and his B. S. degree in forestry from Colorado Agricultural College in 1920.

Forest Service Transfers Key Personnel

Arthur W. Greeley, regional forester in Alaska since 1953, became regional forester for the North Central Region of the Forest Service at Milwaukee, Wis., at the end of October. He succeeds H. Dean Cochran, who retired October 31.

Percy D. Hanson, regional forester for the Northern Region, transferred to Juneau, Alaska, and Charles L. Tebbe, regional forester for the Eastern Region since 1952, succeeded Mr. Hanson at Missoula, Mont.

Public

New Pay Scale for Pennsylvania Foresters

Maurice K. Goddard, secretary of the Pennsylvania Department of Forests and Waters recently announced the reclassification of Pennsylvania foresters, with accompanying pay increases compatible with, or better than, rates offered by adjacent states, federal services, and industry.

The newly established titles and annual salary ranges for foresters are as follows:

Forester I, with a salary range of $4,329 to $5,529, is the beginning level for professional forestry work, requiring only graduation from a forestry school accredited by the Council of the Society of American Foresters.

Forester II is the category requiring "supervisory and technical forestry work," and is open to graduates of accredited forestry schools with at least one year of professional experience. Salaries range from $5,007 to $6,390.

Forester III, paying $6,090 to $7,772, is primarily an administrative and supervisory type position in directing the forestry program in a forest district characterized by a small acreage of state forest land, with responsibility for the direction of a major phase of the forestry program in a district characterized by a large acreage of state forest land, or performing responsible field and other forest research work. This classification is open to graduates of accredited forestry schools with four years of progressively responsible experience.

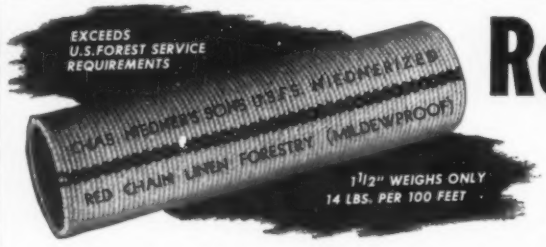
Forester IV, rated at a salary level of $7,055 to $9,011, performs administrative forestry work in "directing the forestry program in a forest district characterized by a large acreage of state forest land, or acting as an assistant to the director of a major phase of the statewide forestry program." In addition to graduation from an accredited forestry school, six years of progressively responsible experience is required.

Forester V, paying from $8,580 to $10,954, requires the overall direction of a major phase of the forestry program on a state-wide basis. Eight years of progressively responsible experience, in addition to graduation from an approved forestry school, constitutes the requirement for qualifying in this forester category.

The State Forester, as the title indicates, is the highest of the technical forestry positions in the Pennsylvania Department of Forests and Waters. He reports directly to the Secretary of the Department. Ten years of experience in forestry, plus graduation from an accredited forestry school is required. The position pays from $10,954 to $13,979. This is the first official use of the title "State Forester" in Pennsylvania.

The reclassification survey was conducted under the technical supervision of the Public Administration Service of Chicago. The survey staff worked more than a year to develop a classification plan to cover the state's 65,000 employees. The six classes of foresters represent but a small part of the 1200 classes described in the plan.

Forty-six basic salary grades have been established, from a minimum of $1,800 to a maximum of $20,629. Each grade is divided into 5 increments of 5 percent each, thus providing a 25 percent span between minimum and maximum pay in each grade. Each class of employees has been assigned to the pay grade shown by the survey to be most applicable. It is anticipated that the 5 percent increments within grade will be given annually on a merit basis, which is a new policy for noncivil service employees in Pennsylvania.



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The Armstrong Forest Company here presents a brief story on how it is handling one of its current management problems, in the hope it will be of interest and perhaps of some use to the reader.

In Pennsylvania an uncontrolled deer herd presents a problem which has assumed serious proportions. No research on natural or artificial regeneration can be effective without positive exclusion of deer from the test area. Recently we had need so to protect an area of some 13 acres where a partial cut for veneer logs, sawlogs and pulpwood had been made. After the logs had been removed, the pulpwood was drayed to the primary and secondary truck roads which formed the perimeter of the area to be protected. Instead of ranking the wood in the usual roadside manner, we used an adaption of the southern practice of "penning" wood so that a continuous fence of penned wood formed an enclosure 7 to 8 feet in height. One lineal chain of fence required 3 cords of wood; 150 cords enclosed the 13 acres. (A square area of 100 acres would require only 380 cords.) The preparation and draying of wood to roadside was a normal operation. The extra time required to "pen" the fence was the major cost item, and delivery of the wood will be delayed perhaps three growing seasons.

The photo of the line-up of cars in front of the deer fence was taken at the August meeting of the Northeastern Tree Improvement Conference, during which members observed vegetative propagation of veneer grade black cherry, field testing of numerous clones of hybrid poplar, as well as natural regeneration which may be expected from crop trees that have been selected to be carried through several cycle cuts for pulpwood prior to the regeneration cut.

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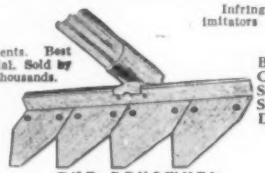
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Change in National Forest Cutting Regulations

Regulation S-13 of the rules and regulations governing the occupancy, use, protection, and administration of the National Forests has been amended with respect to payment in advance of cutting timber so as to read as follows:

"S 221.13: Payment in advance of cutting; refunds and transfer. (a) Timber and forest products must be paid for in advance of cutting under any scale contract or sale permit except that, when the contract or permit so specifies, payment may be made after the timber is cut and scaled provided the purchaser prior to cutting furnished a bond with corporate surety, satisfactory to the Forest Service or in lieu thereof deposits with a Federal depository through the Forest Service, negotiable securities of the United States, having face value not lower than the value of the timber to be cut before payment is made and accompanied by power of attorney and agreement authorizing the bond approving officer to sell or collect such securities if payment is not made for timber cut. Sums deposited for payment in advance of cutting in excess of amounts found to be due the United States may be refunded to original depositors, their local representatives, or to successors in interest."

Pechanec Succeeds Demmon at Southeast Forest Experiment Station

Joseph F. Pechanec, chief of Range Management Research for the U. S. Forest Service, has been promoted to director of the Southeastern Forest and Range Experiment Station at Asheville, N. C., succeeding Elwood L. Demmon, director there since 1951.

Born in Nampa, Idaho, Mr. Pechanec received his B. S. degree in forestry from the University of Idaho in 1932. He has been with the Forest Service since 1933. For several years he had charge of the range research program which the Forest Service conducts in cooperation with the Agriculture Research Service at the U. S. Sheep Experiment Station, Dubois, Idaho. In 1945 he headed up livestock and big game range research work for the Forest Service in Washington and Oregon. He has been in his present position since 1953.

Pechanec was one of the founders and the first president of the American

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Society of Range Management. He was editor of the *Journal of Range Management* in 1953.

Division of Cooperative Tree Planting Set Up in Forest Service

To meet demands for technical help in tree planting, which are expected to increase as a result of the Soil Bank Conservation Reserve program and the expanded federal aid to states for reforestation, authorized by the Agriculture Act of 1956, the Forest Service is establishing a Division of Cooperative Tree Planting, the U. S. Department of Agriculture has announced.

Chief R. E. McArdle of the Forest Service has delegated responsibility for the work to assistant chief William S. Swingler. The new division will provide for the Department technical forestry assistance in administering the Conservation Reserve section of the Soil Bank.

It will also give technical advice and guidance to states in carrying out expanded reforestation programs on state and privately owned forest lands. These programs will be planned by the state foresters and approved by the Secretary of Agriculture.

There is no definite indication yet as to how much of the cropland retired from production under the Conservation Reserve will be planted to trees. The law, however, recognizes tree planting as an approved practice, and foresters in many parts of the country report they expect it to be very popular.

California Experiment Station Has New Division to Study Diseases

A new research division has been set up at the California Forest and Range Experiment Station to combat forest tree diseases in the California region. It will take over work formerly conducted by the Station's Division of Forestry Management Research and the Blister Rust Control Unit in the San Francisco regional office of the Forest Service.

Dr. George M. Jemison, Station director, announced that Harold R. Offord formerly of the blister rust control unit, has been named chief of the new division.

G. L. Hayes Heads Management Research at Rocky Mountain Station

G. L. Hayes has been appointed chief of the Division of Forest Management Research for the Rocky Mountain Forest and Range Experiment Station, according to Raymond Price, director.

Mr. Hayes will fill the position left vacant by Dr. Jesse H. Buell's retirement from the Forest Service last April.

Since 1949, Hayes has been in charge of a research center of the Pacific Northwest Forest and Range Experiment Station in Roseburg, Ore., where he conducted studies in Forest management, regeneration, brushfield reclamation, silviculture, and watershed management.

A native of Utah, Mr. Hayes began his career with the Forest Service in 1934 at the Northern Rocky Mountain Forest and Range Experiment Station. In 1942, he transferred to the Southeastern Forest Experiment Station to serve as project leader in forest fire research at Asheville, N. C. During 1947-48, he taught forestry courses at Oregon State College.

Mr. Hayes received a B.S. degree in forestry from the University of Idaho in 1934, a Master's degree in forestry from Yale University in 1940, and completed an additional year of

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graduate study in forest meteorology at the University of California in 1946-47.

In 1954-55, he served as chairman of the Columbia River Section of the Society of American Foresters. He is also an active member of Xi Sigma Pi and Sigma Xi.

Fire Research Division Set Up at Alexandria, La.

David Bruce has been appointed chief of the Southern Forest Experiment Station's newly established Division of Forest Fire Research at Alexandria, La., according to Philip A. Briegleb, director of the station.

The division will investigate the prevention, behavior, control, and effects of wildfires, as well as the use of prescribed fire in the management of forest land. All major southern timber types will be studied, hardwood as well as pine.

Bruce graduated from Yale University in 1936 and received the Master of Forestry degree from Yale in 1937.

After working in the Northeast and the Black Hills of South Dakota, he started research on fire behavior in the South in 1939. From 1941 to 1945 he served in the Corps of Engineers, U. S. Army. Then he moved to Gulfport, Miss., to study forest fire effects and the use of fire in forest management.

In 1951 he was placed in charge of the Gulfcoast Research Center, at Gulfport. In the fall of 1954 he taught forest economics and fire protection at Purdue University. For the past 1½ years he has been staff specialist in forest fire for the Southern Forest Experiment Station.

New Head For Watershed Research at Experiment Station

Edward A. Johnson, formerly in charge of the Coweeta Hydrological laboratory in North Carolina, has assumed new duties as chief of the Division of Watershed Management Research at the Central States Forest Experiment Station, W. G. McGinnies, director of the Station announces.

After graduating in forestry from the University of Michigan in 1940, Johnson worked for 2 years with the Hydraulic Data Branch of the Tennessee Valley Authority. During part of his 3-year Navy career which followed, Johnson was attached to the Hydrographic Office.

After the war he joined the U. S. Forest Service and was assigned to the Intermountain Forest and Range Experiment Station where he worked in range watershed research. Later he was transferred to the Southern Station as a hydrologist. From there he went to the Southeastern Station where he headed up the Coweeta Laboratory for eight years. During his stay at Coweeta he was technical director for the movie "Waters of Coweeta."

Spruce Budworm Spraying Completed for 1956

This summer's campaign against the spruce budworm has been completed with the aerial spraying of 1,370,000 acres of infested lands in the West, the U. S. Department of Agriculture reports. The Forest Service, state agencies, and private landowners cooperated in carrying out the campaign. Costs were slightly less than $1.00 per acre. Work was done by private contractors without a single serious accident. The spraying included some 885,000 acres in Montana and northern Idaho; 500,000 in southern Idaho; and 6,000 in New Mexico.

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Transfer of Two National Park Service Officials Announced

J. Barton Herschler, superintendent of the Millerton Lake National Recreation Area, Calif., has been appointed superintendent of Saguaro National Monument, Ariz., according to an announcement by the Department of the Interior. He succeeds John G. Lewis, who will become superintendent of Isle Royale National Park, Mich.

Herschler, a native of Ashland, Ohio, has been with the National Park Service since 1929. His assignments, in addition to superintendent at Millerton Lake, have included those of park ranger and superintendent, Muir Woods National Monument, Calif., and chief park ranger, Rocky Mountain National Park, Colo. He studied forestry at the University of Montana and is an S.A.F. member.

Statistician Appointed to Rocky Mountain Station.

Dr. Jacob L. Kovner has been appointed statistician for the Rocky Mountain Forest and Range Experiment Station, with central headquarters at Fort Collins, Colo., according to Raymond Price, director.

In this newly created position, Dr. Kovner will serve as staff assistant and consultant to the director.

Before coming to the Station, Kovner was project leader in watershed management at the Coweeta Hydrologic Laboratory in North Carolina. He served 4 years with the Ordnance Corps during the war. From 1935 to 1941, he was employed as statistician in private industry.

A native of Brockton, Mass., Kovner holds a B.S. degree in mathematics from Yale and a Ph.D. degree in forestry from the State University of New York College of Forestry.

Aughanbaugh Joins Ohio Agricultural Experiment Station Staff

John E. Aughanbaugh, for many years research forester with the Pennsylvania Department of Forests and Waters at Mont Alto, has joined the forestry research staff of the Ohio Agricultural Experiment Station at Wooster.

He will conduct investigations in farm woodlands and plantation management.

Northeast California Research Center Established

A. L. Hormay, range conservationist of the California Forest and Range Experiment Station, Berkeley, has been named to head research work at a new center of the Station to be established in Susanville in northeast California. The Center will concentrate on timber and range management problems of the plateau region.

Donald T. Gordon has been named manager of the Center's two experimental forests: Black Mountain, which has been used for ponderosa pine studies, and Swan Mountain, where work on red and white fir will begin next year.

Wenger Transfers To Asheville

Dr. Karl F. Wenger, of the Tidewater Forest Research Center, Franklin, Va., has been transferred and promoted to the position of staff specialist in the Division of Forest Management Research at the Southeastern Forest Experiment Station headquarters in Asheville, N. C., according to an announcement by the station director.

Dr. Wenger has been with the U. S. Forest Service since 1940 and has experience on the forest survey and in forest management research at the Lee Experimental Forest in Virginia and the Santee Research Center in South Carolina, in addition to six years as silviculturist at the Tidewater Research Center.

He has a Ph.D. degree from Duke University and is the author of some 15 research publications in the fields of silviculture and tree physiology. He was in service for 2½ years during the war and is a major in the Air Force Reserve.

In his new assignment Dr. Wenger will assist the Station's seven research centers in the planning, review, and coordination of their research in forest management, silviculture, and regeneration. He will also bring together the results of regional studies such as the relation of stand density to the growth of loblolly pine.

1956 Timber Sales $7.5 Million Over All-time High on BLM Lands

Timber sales on 161 million acres of the public lands managed by the Bureau of Land Management reached an all-time high of $27.5 million in fiscal year 1956, the Department of the Interior has announced.

The BLM timber lands lie in the western states and in Alaska outside of established national forests.

BLM Director Edward Woozley attributed the record sales total, which is $7.53 million above the previous high of $19.97 million sold in 1955, to increased timber values generally and more timber made available by BLM foresters through improved management and new inventories. The 1956 output totaled 834 million board feet compared to a volume of 763 million in 1955.

A major portion of the total sales consisted of Douglas-fir from the two million acres of revested Oregon and California Railroad Grant lands in western Oregon.

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San Isabel Forest Supervisor Promoted

Edward W. Schultz, supervisor of the San Isabel National Forest, headquartered at Pueblo, Colo., has been promoted to a position in the Operation Division of the Forest Service office in Washington, D. C. His successor will be John F. Douglas, promoted to supervisor from his assignment of forest staff assistant on the Routt National Forest at Steamboat Springs, Colo.

Mr. Schultz received his B.S. degree in forestry from Oregon State College in 1941. He entered the Forest Service as a forest guard in 1939 on the Malheur National Forest in Oregon. He became supervisor of the San Isabel in July 1954.

Mr. Douglas entered the Forest Service in 1935, as lookout on the Wenatchee National Forest in Washington. He received a B.S. degree in forestry from the University of Idaho in 1937.

Bighorn Supervisor Promoted

Philip L. Heaton, supervisor of the Bighorn National Forest at Sheridan, Wyo. has transferred to the Denver Regional Office of the U. S. Forest Service, according to Regional Forester Donald E. Clark.

Heaton will serve as assistant to the head of the Division of Recreation, Lands and Watershed Management covering 16 national forests in Colorado, Wyoming, South Dakota, and Nebraska.

Heaton has served as supervisor of the Bighorn Forest at Sheridan since May 1952. Prior to that time, he served in various capacities including forest ranger and forest staff assistant. In 1947 and 1948, he was on special assignment to the War Department as forestry advisor in Korea.

Broido To Conduct Fire Research At California Experiment Station

Abraham Broido has joined the staff of the California Forest and Range Experiment Station to conduct basic research on the combustion processes in forest fires, it has been announced by Dr. George M. Jemison, director of the Station.

Broido will be assigned to the fire physics section of the station's division of forest fire research. A resident of San Mateo, he was formerly with the U. S. Naval Radiological Defense Laboratory in San Francisco.

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Education

J. C. Sammi Promoted to Professor at New York College of Forestry

The promotion of John C. Sammi from associate professor to full professor of forest management has been announced by the State University College of Forestry at Syracuse University.

A native of San Francisco, Calif., Professor Sammi received a B.S. degree from the University of California in 1922. He continued his studies at the College of Forestry and received an M. F. degree in 1931.

After six years' affiliation with the Forest Service Professor Sammi joined the research team at the University of California in 1928. He has also been employed by the New England Forest Experiment Station, New Haven, Conn.

In 1929 he was appointed an instructor in forest engineering at the College of Forestry. He was promoted to assistant professor in 1936 and to associate professor in 1948.

He is a Member of the Society of American Foresters.

Georgia University Requests Nominations of Outstanding Forestry Workers

The University of Georgia, Georgia Peabody School of Forestry began in September its Golden Anniversary celebration which will continue through the school year to June 1957.

In May 1957 the fiftieth year will be celebrated in Athens, Ga., with a meeting of all available alumni. During this meeting awards will be made to men who have made outstanding contributions to forestry in the South.

The committee requests that anyone having any nominations for this award send them to Robert D. Dixon, c/o Osmose Wood Preserving Company, Griffin, Ga. It was emphasized that nominees need not be graduate foresters.

Tom Wallace Chair Established at Louisville University

A Tom Wallace chair of conservation has been set up in the biology department of the University of Louisville with a $235,000 endowment grant from anonymous donors. The chair is named for the noted editor emeritus of The Louisville (Ky.) Times, who was one of America's pioneer conservation leaders.

Mr. Wallace, now 81 years of age, has been a member of the advisory

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board of the National Parks Service, president of the Izaak Walton League of America, and chairman of the National Conference on State Parks. He founded the Ohio Valley Regional Conference on State Parks and is an honorary member of the Society of American Foresters and the American Society of Landscape Architects.

C. B. Hupman Appointed Manager of Pack Demonstration Forest

The University of Washington College of Forestry has announced the appointment of Carl B. Hupman, Jr., as resident manager of the Charles Lathrop Pack Demonstration Forest at La Grande, Wash.

Hupman received his bacheler's degree in forestry at the University of Washington in 1935 and his M.S. degree from Yale in 1946. After graduation he worked with the Firestone Plantations Co. in Liberia, West Africa, in the development of some of their rubber plantations. In 1942 he returned to the United States and served as an aerial navigator in the Fifteenth Air Force. He held the rank of captain at the time of his separation from the service.

After completing his graduate work at Yale Hupman was employed by the Brown Paper Co., Monroe, La., and in 1947 joined the Crossett Co., Crossett, Ark., remaining with that concern until acceptance of his current position.

Appointments to Purdue Staff

Three appointments to the teaching and research staffs of the Purdue University Department of Forestry and Conservation have been made recently.

Professor Clair Merritt, who went to Purdue from a professorship at the New York State Ranger School at Wanakena, N. Y., will teach courses in silviculture and forest protection and conduct research in forest tree physiology. Professor Merritt received all of his professional training at the University of Michigan.

Thomas W. Beers, who holds the bachelor and master's degrees from Pennsylvania State University, will serve as instructor in the Agricultural Experiment Station. His work will involve research in silviculture and forest management.

A 1949 graduate in forestry of Purdue University, Robert H. Perkins, will hold an instructorship in wood utilization research in the Agricultural Experiment Station.

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Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously, the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

Positions Available

FORESTERS WANTED

Large industrial plant with extensive timber holdings has several openings for graduate foresters, with or without experience. Positions will be in the neighborhood of Savannah, Ga. Good pay, retirement benefits, medical and hospital plans, all fringe benefits usually associated with a large company.

If interested write Forester, PO Box 981, Savannah, Ga., giving information usually called for in an employment application.

Position open in Southern New England with State Division of Forests. State car, uniform and equipment furnished. State employee benefits. Must have forestry degree. Experience not necessary, but helpful. To work with small woodland owners and operators, giving them technical forestry assistance. Starting salary $320 to $406 per month. State pertinent information in application.

Box A, Journal of Forestry, Mills Building, Washington 6, D. C.

Private Forestry—Southern New England. Position open to Graduate Foresters about 23-26 years old who wants to settle down in this area. Work is varied and interesting; includes forest products marketing, marking and estimating timber, organizing small local work crews for planting trees, weeding plantations, girdling, spraying, etc. Must like to meet people from all walks of life.

Box B, Journal of Forestry, Mills Building, Washington 6, D. C.

Graduate forester with experience in fire control with heavy equipment. Southern graduate. $4500 per year. Give detailed information and references. Box 237, Hinesville, Georgia.

An opening is available for a specialist in audio-visual aids in the Research and Education Department of the Texas Forest Service. Duties will include production of motion and still pictures, recorded and transcribed radio programs, displays and exhibits, and related activities.

Gross Salary is $4,500. Apply to Texas Forest Service, College Station, Texas.

New Xi Sigma Pi National Officers Announced

Dr. L. W. R. Jackson has recently been elected national forester of Xi Sigma Pi, Forestry Honor Fraternity. Professor B. F. Grant, at the same time, was elected associate forester. These elections were necessitated by the death of Dean D. J. Weddell, forester-elect, on May 31.

Dr. Jackson is professor of Silviculture and Mr. Grant is professor of forest utilization at the school of Forestry, University of Georgia, where the National Headquarters of Xi Sigma Pi are located until July 1, 1958.

Professor J. Reid Parker is national secretary—fiscal agent.

Special Fire Control Curriculum Started at Montana

The School of Forestry of Montana State University has announced development of a special curriculum in forest fire control. Much emphasis will be placed on the science of meteorolgy and its application to fire control techniques. New courses in the curriculum in addition to forest meteorology include fire plans and a laboratory course in fire suppression machinery.

Assistant Professor Robert W. Steele will be in charge of organizing the curriculum.

Becking To Join Staff at University of New Hampshire

Dr. Rudy W. Becking has been appointed assistant professor of forestry at the University of New Hampshire, Durham, N. H.

A native of DeBilt, Netherlands, Dr. Becking began his forestry work in this country September 1, teaching classes in forest mensuration, management, and photogrammetry.

Potter Takes Charge of Tully Forest and Experiment Station

Shelley W. Potter, Jr., has been appointed forester-in-charge of Tully Forest and the Forest Experiment Station, of the State University of New York College of Forestry.

For four years prior to his move to Tully Forest, Potter was in charge of all woods work at the Harvard Forest, maintained by Harvard University.

He received his B.S.F. degree from the University of Michigan in 1951 and is a 1947 graduate of the New York State Ranger School at Wanakena, N. Y.

Private corporation desires to employ young experienced forester to assist in management sixty thousand acres forest land in four Eastern states including making timber estimates, marking, selling, supervision, preparation management plans, planting, improvement cuttings and assist in furthering present acquisition program. Position believed to offer both opportunity and potential to qualified candidate. If interested write—

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Positions Wanted

Forester B.S.F. 1954. Two years Army Photo Interpretation experience. Seek employment in West Virginia, Virginia, North Carolina, Pennsylvania. Age 23, single. Separated from Army November 1, 1956.

Box U, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, BSF., Pa. State, 1940; M.S.F., (Mgmt.), Duke Univ., 1941. Age 37, Married, 3 children. Associate manager 8 years, manager 7 years of Estate 250 acre Apple Orchard 2600 Acre timber and 75 head Dairy. Experienced in management of Estate woodland, woods work marking to sales of products. Desire position in East.

Box V, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., Forest Mgmt., Oregon State, 1948; age 35, married, 6 years experience in fir and pine regions of Oregon and Calif. with large and small firms cruising, line-running, marking, scaling fire protection, supervising contract loggers, buying logs, timber, and rough lumber. Desire opportunity with progressive company in western states.

Box W, Journal of Forestry, Mills Building, Washington 6, D. C.

Forestry graduate, age 38, married, no children. Now with U.S.F.S. Experience in timber management, sales administration, scaling, cruising etc. Would like to change to private industry. Prefer western states, but would consider any locality.

Box X, Journal of Forestry, Mills Building, Washington 6, D. C.

Private & Industrial

G. C. Romeiser Appointed Secretary-Manager of Walnut Association

George C. Romeiser was recently appointed secretary-manager of the American Walnut Manufacturers' Association, Chicago. He succeeds Charles

Forester and professional registered Land surveyor 33. Federal Institute of Technology Zurich 1947, married, no children. Experience 4 years traversing trespasses, mapping, property-lines, nursery, general management, thinnings, 2 years mill-engineering, 2½ years highway engineering. Desires position with possibilities for advancement. West coast preferred. Also interested in overseas work. Speak and write German and French.

Box Y, Journal of Forestry, Mills Building, Washington 6, D. C.

Graduate Forester, 31 years old; Veteran; 7 years research experience. Desires relocation to northern states.

Box Z, Journal of Forestry, Mills Building, Washington 6, D. C.

H. White, who, on October 1, assumed the position of sales manager of the Wolverine Finishes Corporation of Grand Rapids, Mich.; Louisville, Ky.; and Morganton, N. C.

Formerly with Southern Hardwood Producers, Inc., Memphis, Tenn., Mr. Romeiser worked primarily with trade promotion and statistical programs. Prior to that, he was a member of the National Lumber Manufacturers' Association staff and engaged in the promotion of lumber and wood products through close contact with government agencies.

Mr. Romeiser received his degree in forestry from Purdue University in 1939. He later joined the Forestry Relations Department of the Tennessee Valley Authority. He served with the Army for five years during World War II, attaining the rank of major.

In his new post, Mr. Romeiser will develop trade extension and merchandising programs for manufacturers, designers, and architects. The program will also include continued trade and consumer advertising and special development work on new products and finishes.

NEW SOCIETY PUBLICATION AVAILABLE

Forest Practices Development in the United States, 1940-1955

Report of the Committee of Forest Practices, Division of Silviculture, Society of American Foresters, Kenneth P. Davis, *Chairman*.

The report is in three parts: (1) highlights of major developments affecting forest practices during 1940-1955, (2) digest and summary of present state legislation on cutting practices, and (3) annotated bibliography with a key to 1940-1955 literature.

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Woods Firm Gets Seedling Contract

Award of a $26,000 contract to John B. Woods & Son, Inc., of Salem, Ore. for the production of approximately 3,500,000 Douglas-fir tree seedlings has been announced by the Department of the Interior.

The contract, advertised by the Bureau of Land Management, calls for production of the seedlings in time for the 1957-58 planting season.

BLM Director Edward Woozley said that the seedlings are needed to reforest portions of revested Oregon and California Railroad Grant Lands of Western Oregon.

McCulloch Motors Honors Workers In Forest Resource Development

At a special ceremony late in July commemorating the progress of the McCulloch Motors Corp. in Los Angeles, tribute was paid to the outstanding contributions made by the U. S. Forest Service in the development of the nation's forest resources. McCulloch Motors observed its tenth anniversary of operations in California and the manufacture of the 500,000th engine product by the company.

The company presented a gold-plated commemorative chain saw to the Forest Service. Charles Connaughton, in charge of the western region, accepted the saw on behalf of Richard E. McArdle, chief of the Forest Service.

Blake Lesansee, chief of the Zuni Indian forest firefighters of New Mexico, accepted a chrome-plated saw presented to his people for their work in forest preservation.

The third commemorative saw was presented to DeWitt Nelson as director of Natural Resources for California and president of S.A.F.

Announcement was made of plans for the launching of a nationwide pro-

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Chain Saw Age	802
Clark, Thomas G.	805
Clifton, Thomas C.	805
Cranston, Keith	804
Eastman, Jr., William A.	805
Fechheimer Bros. Co.	802
Forest Seeds of Calif.	798
Forestry Suppliers, Inc.	746
Hale Fire Pump	801
Hall, Albert G.	805
Hall, Jack M.	805
Hammon, Jensen & Wallen	804
Hazard, J. O.	802
Homelite Corp.	back cover
Keene Forestry Assoc.	798
Kurfew, Inc.	798
Lemieux, Frank	805
Lind Co., A. L.	798
Lowther Co., Harry A.	798
Lufkin Rule Co.	793
Mall Tool Co.	792
Mann Edge Tool Co.	800
McCulloch Motors Corp.	776, 777
Meadows, Ben	799
Melin Meterological Service	802
Midvale Chemical Co.	807
Musser Forests	801
Nelson Co.	807
Niedner's Sons Co.	796
Northeast Forestry Service	805
Northern Tree Co.	805
Panama Pump Co.	802
Pond & Moyer	805
Prentiss & Carlisle, Inc.	805
Price, William H.	805
Rich Fire Tool	798
Rootspred	795
Ryker, Inc., Harrison C.	798
Sandvik Steel, Inc.	793
Schultz & Co., C. D.	804
Sebrell Corp., J. B.	798
Sewall Co., J. W.	804
Silva, Inc.	798
Smith Co., D. B.	second cover
Southern Coatings	794
Southern Seed Co.	802
Stock, John W.	805
Sunerest Evergreen	802
Timber Mgmt. Service	805
Tree Farm Mgmt. Service	805
Walpole Co.	795
Western Fire Equipment	791
Weyerhaeuser Tbr. Co.	790

gram by which McCulloch dealers will cooperate with the tree farm program of the A.F.P.I.

Heads C of C Resources Committee

Reappointment of Frank E. McCaslin, president of the Oregon Portland Cement Company, Portland, Ore., as chairman of the Natural Resources Committee, Chamber of Commerce of the United States, for the year 1956-57, has been announced by Chamber President John S. Coleman. McCaslin has headed the group for the past three successive years.

With representation from all parts of the country, the 43-member committee helps to guide National Chamber policy on issues affecting forestry, mining, coal, oil and gas, water resources, electric power, and federal lands.

Paper Company Research Award Announced

Selection of Jack Stubbs, 1953 forestry graduate of Michigan State University, for the 1956-57 Minnesota and Ontario Paper Company Forestry Research Project award has been announced by Dr. Frank H. Kaufert, director of the University of Minnesota's School of Forestry.

This annual award by "Mando" has supported graduate students at the school continually since its initiation in 1946.

Stubbs will continue past research studies on the growth and survival of balsam fir and spruce on recently logged lands. He recently completed two and one-half years of Army service with the Signal Corps.

W. S. Stover, Consultant

William S. Stover, for 22 years on forest survey at the Southern Forest Experiment Station, New Orleans, La., and for eight years in charge of the project, in May resigned from the U. S. Forest Service to work as a forestry consultant. He will specialize in forest resource and related work, and in survey design and planning.

Stover joined the Southern Forest Survey, then just started, in 1934, under I. F. Eldredge, regional survey director. Since then, except for 19 months in military service, he worked on initial survey of 10 of the 12 southern states, on resurvey of six states, and just prior to his resignation got a third survey under way in Mississippi.

He is a graduate of Michigan State College in 1925 with a bachelor's degree in forestry. His address is 6178 Louisville Street, New Orleans 24, La.

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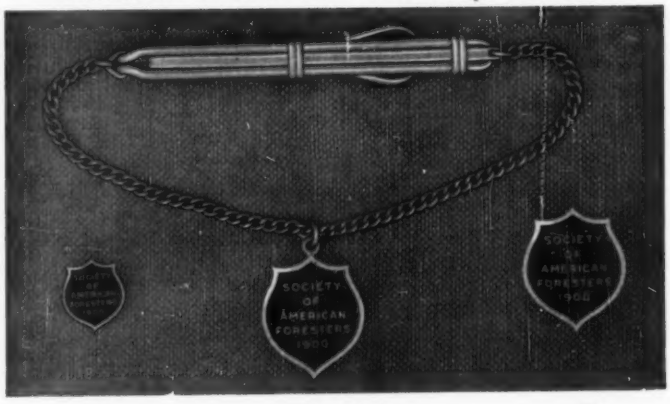

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Back from fighting its first fire

On its initial assignment for Alabama's Forestry Division, this CAT* D2 Tractor proved to be a good investment

Seldom does any machine have the chance to prove its worth its first time out, as this D2 did. Equipped with a No. 2A Bulldozer and Rome fire plow, it took just 8½ hours to suppress a fire against which a crew, working 16 hours with light equipment, had battled in vain. Estimated loss was held to $500, compared with a $5000 loss in a previous fire fought for 5 days under similar conditions by a 32-man crew with light equipment. Boiled down, here are the details!

The place: Brewton, District 11 Headquarters of Alabama's Department of Conservation, Forestry Division. The fire: surface and underground in a swampy area covering some 65 acres of virgin timber. The date: October, 1954.

4:36 P.M. the 22nd: Fire reported. Because of adverse conditions, men were unable to pinpoint the blaze in the swamp that night.

8:56 A.M. the 23rd: Crews were on the fire, fighting it with a light tractor and hand tools.

6:30 A.M. the 24th: The D2, just made available, was sent to the fire. There was a period of scouting and planning. At 9:00 A.M. the D2 started plowing and 'dozing, making several passes to get down to mineral soil. In 8½ hours the fire was suppressed.

Since then this D2 has continued to prove its worth in such duties as clearing for tree planting, and building firebreaks, as well as fighting other fires. It's light enough to be hauled easily, yet powerful and rugged enough to stand up under heavy work. For facts about features that enable it to do *more* work at *lower* cost than other units in its power range, see your Caterpillar Dealer.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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Model EZ . . . lightest, most powerful direct drive chain saw ever developed. Only 19 pounds, full 5 horsepower. Brings down trees up to 3 feet in diameter.

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